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Health and economic activity:

A time-series analysis of Canadian mortality and unemployment rates

1950-1977

by O.B. Adams

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PREFACE

Despite the tremendous advances that have been made in prolonging life, due to both the field of biomedical science and technology, and to improvements in social and living conditions, health remains a primary concern to the field of social policy and decision-making.

In recent years, researchers of the dynamics and levels of health have adopted a much broader perspective, one which looks beyond the toxic agent/disease sequence, and the resulting intervention by the medical care system, to encompass the contribution of the physical and social environment to the study of the correlates and determinants of health. With regard to the implications of the social environment, the importance attached to the economic activity of a society as a determinant of the health, well-being and longevity of its members is practically universal.

While historically, these implications have been examined in a comparative perspective, for example, the study of cross-national mortality differences, or the analysis of mortality across social class and occupational groups, the growing availability of lengthy time-series of mortality and unemployment rates has led to much longitudinal research, whereby changes in economic activity are correlated with changes in health, as inferred from mortality.

Based on this latter approach, Dr. M. Harvey Brenner has reported startling results for the United States, concerning the effect of fluctuations in the unemployment rate on mortality. The extent and generality of his findings, which indicate positive associations between the unemployment rate and many causes of death, across age, sex, race, and geographic area, give rise to certain questions about the Canadian context. Among them are; Is there an association between unemployment and mortality in Canada? What is the direction of such an association? How general is such an association with respect to cause of death and demographic characteristics?

This present study, which comprises a time-series analysis of Canadian mortality and unemployment rates in the period 1950-1977, represents an attempt to provide some answers to these questions.

While taking full responsibility for any errors or omissions in the study, the author wishes to express his appreciation to Mr. Neil MacLeod, Health and Welfare Canada, and Mr. Russell Wilkins, Institute for Research on Public Policy, for their many helpful comments and suggestions on an earlier draft of the report. Special thanks are owed to Mr. Douglas E. Angus, Chief, Research and Analysis Section, Health Division, Statistics Canada, for his continuous review and constructive criticism throughout the course of the preparation of this study.

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CHAPTER 1

INTRODUCTION

Background

Prevailing high levels of unemployment in industrialized society have caused considerable concern and inquiry about the possible implications for the well-being of its members. Nowhere is this situation more evident than in Canada, where the unemployment rate has ranked near the top among those of the member countries of the OECD during the last decade. Widespread concern about this phenomena is evident in public opinion, for example, 30% of Canadians interviewed by the Gallup poll in 1978 identified unemployment as the most important problem facing Canada (Fletcher and Drummond: 1979). Major steps that have been taken to ameliorate the economic hardship occasioned by unemployment are the development and expansion of unemployment insurance, and job creation and training programs.

Increasingly, however, researchers and policy makers have speculated that the extent of the problem of unemployment goes far beyond income replacement. In this regard, unemployment has come to be interpreted as a major potential source of life stress with serious implications for family life and health, to cite but a few topics of concern.

Focussing on the area of health, the generality accorded the "life-event - stress - health/disease" sequence is striking. Summarizing the progress of stress theory, Hinkle has written, "In the 1940's the concepts of 'stress' and the 'life stress' were applied to biological and social systems because they appeared to provide an explanation of the apparently 'non-specific' effects of biologic agents and for the occurrence of certain pathological phenomena, and of certain illnesses, as a part of the response of people to their social environment. At the present time, the 'stress' explanation is no longer necessary. It is evident that any disease process and in fact any process within the living organism, might be influenced by the reaction of the individual to his social environment or to other people" (Hinkle: 1973: pp. 42-43).

To relate this growing trend of research to the incidence of joblessness, unemployment has frequently been identified as a cause of various forms of social pathology, for example, crime, suicide and alcoholism, particularly in the wake of the Great Depression. Such inquiries have usually taken the form of studies of the statistical association between unemployment and various "social indicators", the ones most frequently chosen (and available) being mortality and crime rates.

Despite the availability of fairly lengthy time-series data which monitor the levels of a wide variety of health and social conditions, there have been surprisingly few Canadian studies, in comparison to numerous projects carried out in the United States, dating from 1922, and culminating with the comprehensive work carried out for the U.S. Department of Labor (Brenner: 1971a) and for the Joint Economic Committee of the U.S. Congress (Brenner: 1976). In view of the American findings, Sismondo (1978) has lamented the lack of corresponding Canadian research. "When the historical patterns of unemployment are compared with those of several health and crime indicators, the relationships in the pre-war period seem unequivical. Unemployment did have a massive effect on death, illness, crime (particularly homicide), alcoholism and innumerable other social and personal pathologies ... A serious effort to test these findings in the Canadian context today is urgently required" (Sismondo: 1978:35).

Objectives and Scope

The purpose of this paper is to provide a detailed examination of the statistical association between the unemployment rate, and mortality and psychiatric morbidity rates, using Canadian data from the post-World War II period, 1950-1977.

This will comprise a multiple regression analysis of detrended time-series of the above rates, and is intended to provide some answers to questions such as: Is there an association between mortality and fluctuations in the economy? What is the direction of the association. Are increases in unemployment associated with increases or decreases in mortality? How general is such an association across age, sex and cause of death categories?

Limitations

Three major limitations must accompany the interpretation of the findings in this study. The first is that the length of the time-series is relatively short (N = 28). Because of the short series, constraints are placed on the ability to examine the presence of lagged association between unemployment and mortality. Secondly, the use of mortality rates as indicators of health is a very conservative test of the relationship. Clearly, causes of death such as heart disease and lung cancer are preceded by a period of morbidity. The availability of morbidity data, however, dates only from approximately 1960, therefore, such a test must await further passage of time. Thirdly, because of the ecological nature of the analysis, the results cannot be applied downwards to permit inferences about the behaviour of individuals.

Literature Review

Beyond the observation that there is a reliable association between fluctuations in the economy and mortality rates, the literature is inconclusive. Indeed, it appears that there is an emergent controversy concerning the basic direction of the relationship, particularly in the post-World War II period. It should be emphasized that much of this "debate" may be identified only implicitly in the literature. This owes to the tendency of past research (and the interpretation of its findings) to have been motivated from the longstanding and well-documented inverse association between mortality and socio-economic status, most frequently observed on a static, cross-sectional basis.(1) Thus, research into the dynamics of these variables that has found evidence for a contradictory position (i.e., lower unemployment associated with higher mortality), has tended to be reported with a degree of ambivalence.

Insofar as the case for an inverse association between economic downturn and mortality is the most emphatically argued in the literature, this side will be presented first.

Economic Downturn and Increases in Mortality

The major body of research that claims support for the inverse association has been conducted by M. Harvey Brenner in the United States. The most comprehensive of his works is **Mental Illness and the Economy** which relates psychiatric admission rates of New York State hospitals to the inverted index of manufacturing employment for selected periods between 1852 and 1960. From the results Brenner concluded, "in New York State, for over 127 years, economic changes are probably the single most important cause of mental hospitalization" (Brenner: 1973: 243). These results were obtained by subtracting the long-term trends from both series and then correlating the residuals.

In a comprehensive report prepared for the U.S. Department of Labor, Brenner has also applied the detrending methodology to mortality rates for the period 1900-1960, and found similar inverse associations. "Among all specific causes of death, the strongest inverse relationships with EMPL (index of employment) are found for heart diseases, cardiovascular-renal disease, ulcers of stomach and duodenum, appendicitis, complications of pregnancy, fetal deaths, deaths of infants under 28 days (of age) death of infants under one year (of age) acute poliomyletis, hernia and intestinal obstruction, and homicide and suicide." (Brenner: 1971a: 52) (see also Brenner (1971b and 1975) for a presentation of similar results obtained by applying the detrending/correlational method to heart disease and cirrhosis of the liver death rates).

The most frequently cited results of Brenner's research, however, are reported in a study prepared for the Joint Economic Committee of the U.S. Congress, based on data from 1940-1974.

Placing the emphasis on avoidable social costs, Brenner has claimed that, "the 1.4 per cent rise in unemployment during 1970 is directly responsible for some 51,570 total deaths, including 1,740 additional homicides, 1,540 additional suicides, and for 5,520 additional state mental hospitalizations"... continuing on to address the policy implications of these new findings Brenner writes, "The human tragedy of unemployment alone revealed by this study is shocking - shocking enough to demand a persistent priority effort by Washington policy planners to reduce unemployment and to keep it low as well" (Brenner: 1977a: 4). It is perhaps a significant point, however, that this study marks a methodological discontinuity from his previous research, in that these data were not detrended. Instead, "efforts were made to substitute mathematically fitted time trends for per capita income in the explanatory equations ... the substitution permits a control for the long-term trend to be present in the explanatory equations without committing us to a particular interpretation of the trend effect" (Brenner: 1977b: 599).

(1) One exception is a paper by Joseph Eyer (1977) entitled, **Prosperity as a Cause of Death.** Eyer argues that stress peaks with the business cycle boom, due to increased migration and longer hours of work. These assertions however, are unaccompanied by statistical results, but rather, a visual examination of the mortality rate and business cycle charts.

As will be shown on the other side of the debate, the adoption of more conservative methods of time-series analysis does not completely support these results.

One additional problem of these analyses is that the results obtained from the use of income as a predictor (positive relationships between per capita income and suicide, homicide, and imprisonment) call into question the major underpinning of Brenner's hypothesis, namely, that "among the major social stresses are those which originate in adverse changes in the economic status of individuals, adverse changes in economic status would restrict the degree to which individuals would be able to procure a great proportion of the goods and services valued in the society" (Brenner: 1971b: 606).

Others who have reported positive relationships between suicide, homicide and unemployment include Henry and Short (1954), Vigderhous and Fishman (1978) and Vigderhous (1977, 1978).

Economic Downturn and Decreases in Mortality

The case for a positive association between economic fluctuation and mortality was made by Emile Durkheim, nearly a century ago, (1897, translated 1951), when he argued that economic fluctuation in **either** direction would prove stressful.

One of the first systematic attempts to relate levels of economic activity to health and social pathology is Durkheim's landmark study of suicide, (1951). Analyzing 19th century European suicide data at the ecological level, Durkheim found that the suicide rate rose sharply within months of a severe financial crisis. While these findings imply the direct interpretation that economic catastrophe makes life more difficult and thus increases the likelihood of suicide, Durkheim presented some additional data which suggest that the relationship is not so simple. He found that suicide also increased after "fortunate" economic crises, for example, wheat price declines and increases in industrial production, events which would be intuitively thought to make life easier. Furthermore, a cross-sectional examination of this data for France showed that those areas which the highest proportion of the population possessing independent means also had the highest rate of suicide.

According to Durkheim, the explanation for these seemingly contradictory findings lies in the failure of the social order to rapidly adjust to fluctuations in the economic order. "In the case of economic disasters, indeed, something like a declassification occurs which casts certain individuals into a lower state than their previous one ... they are not adjusted to the condition, and its very prospect is intolerable" (Durkheim: 1951: 252).

In this event, individuals may not be capable (in the aggregate) of lowering their expectations to meet the reduced capacity of the economic system. A similar imbalance would occur as a result of an economic upturn. "It is the same if the source of the crisis is an abrupt growth of power and wealth ... some particular class especially favoured by the crisis is no longer resigned to its former lot and, on the other hand, the example of its greater good fortune raises all sorts of jealousy below and above it" (Durkheim: 1951: 253). In this latter case, Durkheim believed that the rapid growth of expectations would far outstrip the increased capacity of the economic system to reward them. These "polar" opposites were placed together in the "anomic" category of Durkheim's typology of suicide.

Of the many attempts to replicate this work very few(2) have claimed support for a stressful effect of the upturn, although the statistical results themselves may indicate otherwise. In fact, Pope's (1976) detailed re-analysis of the tabulations in **Suicide** has shown evidence of the disagreement between findings and conclusions. "Crisis severity was measured by number of bankruptcies. Figures on the percentage increase in bankruptcies and suicide are, respectively: 1861, 20 and 9; 1847, 26 and 17; 1854, 37 and 8. There is a negative correlation ($r = -.27$) between increase in bankruptcies and suicide. For the one point at which Durkheim employed an empirical indicator of crisis servity, his data failed to reflect the hypothesized relationship between anomie and suicide" (Pope: 1976: 116).

One of the very few admissions of perplexity about the unexpected finding of a positive relation between the upturn in the business cycle and mortality is found in the writing of Ogburn and Thomas (1922) based on a time-series analysis of U.S. data for the period 1870-1920. "The fluctuations in the curve of these death rates seem to correspond somewhat with the business cycles. The correlation is found to be positive and fairly high, $r = .57$ and with cycles from nine-year moving averages, $r = .63$. This is a surprising result, as one would guess that if there were any correlation at all between business conditions and death rates it would be negative" (Ogburn and Thomas: 1922: 335).

(2) See Pierce (1967) for an example.

Fortunately for the authors, they found a negative correlation between the suicide rate and the business cycle ($r = -.74$) and then proceeded to dismiss the results obtained with the total death rate, on the basis of a curious comparison of the American data with that for England and Wales. In a book published a few years later, Thomas reported the unexpected finding again, suggesting that it was likely to be spurious. "It may be that some non-economic circumstance, synchronizing frequently with prosperity, is at the root of the explanation. Two phenomena of prosperity which might cause a rise in the death-rate are, first, the excessive alcoholism, and secondly, the very high emigration which has tended to occur in times of prosperity and which might raise the death-rate by removing the young and healthy" (Thomas: 1925: pp. 109-10).

A similar interpretative predicament was encountered by Morris and Titmuss, when they observed that rheumatic heart disease mortality failed to decline during the recovery from the Great Depression. Their explanation for this result was rather convoluted. "As the importance of unemployment declined the twin evils of low economic status and bad housing were seen to be buttressing the death rate. As the waves of unemployment subsided, they revealed the peaks of other adverse factors in the social environment" (Morris and Titmuss: 1944: 85).

The major body of evidence which suggests that the relationship between the unemployment rate and mortality is negative is due to Land and colleagues (1976, 1977, 1980). Land's work pertains to the same period as Brenner's study for the Joint Economic Committee, namely, the post-Depression years, and although one reason for the marked discrepancy between the two works may be that the causes of death are not strictly comparable, the chief one is most probably that Land's method is more conservative. Whereas Brenner considered serial correlation only by the inclusion of a fitted time trend in his equations,(3) Land used instead the previous year's value of the dependent variable as one of the regressors.

As a result of employing this method, Land has reported negatively signed unemployment rate coefficients for the following causes of death; diseases of the respiratory system, motor vehicle accidents, and other accidents and violence.(4) Positively signed coefficients were reported for diseases of the circulatory system, and for the heart disease death rate. The explanation given for the findings is that the unemployment rate reflects the overall level of activity in society. "This negative sign is consistent with an interpretation of the unemployment rate as an index of aggregate activity in the socio-economic system. In brief, when the unemployment rate is up, the gross level of a variety of social and economic activities is down, which decreases the exposure to accidents and therefore the accident rate" (Land and Felson: 1977: 350).

Clearly, a more conclusive test of the comparability of the two methods would require a replication of all the mortality rates shown in Brenner (1976). However, Land and McMillen do not appear to have included the unemployment rate as a regressor in the cirrhosis of the liver mortality and infant mortality equations, and they did not examine the suicide and homicide rates explicitly. Elsewhere, the correlations between detrended suicide rates and the detrended NBER composite business cycle indicator have been reported by Hodge and Klorman (1979) for the period 1947-1972. Although the zero-order correlation is positive, the first and second year lagged values are insignificant and the relationship is observed to change direction beyond the third year of lag in the business cycle. Unfortunately, the optimal lag correlations do not appear in Brenner's study for the Joint Economic Committee, hence, no direct comparison may be drawn.

Obviously, this most basic question concerning the direction must be answered before considering other aspects of the relationship, and the implications for policy as claimed by Brenner.

Summary

The literature review has indicated that several researchers have reported a statistical association between fluctuations in the economy (most frequently measured in terms of the unemployment rate) and mortality rates.

This association appears to be of a very general nature, including several causes of death and most age-sex groups. (Brenner: 1977b: 600).

(3) Cohen and Felson have drawn attention to the adequacy of this method in a recent critical article. "For example, of the 893 equations reported in Brenner's 92-table appendix, only about 47% allow acceptance of the null hypothesis that auto-correlation is absent ($p<0.05$). Of the remaining equations, 33% have intermediate Durbin-Watson values allowing neither acceptance nor rejection, while 20% call clearly for the rejection of the null hypothesis that auto-correlation is absent" (Cohen and Felson: 1979: 254).

(4) In the 1976 paper Land and Felson found a negatively signed coefficient for the effect of unemployment on the reported violent crime rate, although it was not statistically significant and was dropped from the final equation.

Concentrating on the findings however, there appears to be substantial disagreement regarding the direction of the association. Likely causes of this disagreement are variables such as the time period of the inquiry and the choice of time-series analytic methodology. Furthermore, the controversy occurs mainly for the post-war period, since virtually every study that includes the "Dirty Thirties" has reported that higher unemployment is associated with higher mortality, regardless of method. Insofar as this latter result appears to be intuitive, explanations for contrary results are not compelling. This point has been noted by Lane in a wry comment on explorations of anomic(5) suicide. "Traditionally this matter has been pursued largely through attempts to correlate the incidence of suicide with the business cycle, efforts which, like Keynesian fiscal policy, are more easily applied to the 'down' side than the 'up'" (Lane: 1980: 82).

(5) See prior discussion of Durkheim.

CHAPTER 2

EFFECTS OF ECONOMIC ACTIVITY ON HEALTH: TESTING THE ASSOCIATION WITH CANADIAN DATA

Introduction and Specification of Model

In view of the wide array of findings reported for the United States, what should we expect to find for Canada? Historically, the stressful impact of the Depression is clear for only a few causes of death.

Taking the suicide rate as an example, "Between 1922 and 1925 the rate remained below 7.0; then began a slow rise until 1930, when, with 9.9 it reached the highest level so far recorded for Canada as a whole" (Dominion Bureau of Statistics: 1960a: 1). Similarly the homicide rate increased from 1.8/1000 in 1929 to 2.1 in 1930, declining to 1.7 in 1931 (Dominion Bureau of Statistics: 1937).Data for other causes of death suggest that it would be necessary to assume a lag between the onset of the Depression and mortality. "Even as late as 1934 the depression was not reflected in statistics of death. But now that statistics for its later years and aftermath are appearing, it is clear that progress in health has wavered" (Marsh et al: 1938: 23).

Considering the time-series for the first half of the century Brenner has reported an inverse association between employment and mental hospital admissions for males in Canada over the period 1914-1955 (Brenner: 1973: 89).(1)

Although the case has been advanced that unemployment is no longer as potentially stressful as it once was, owing to factors such as shifting values (most notably the decline of the Protestant Work Ethic), and ready access to government transfer payments (such as unemployment insurance benefits), there does not appear to be a substantial body of Canadian evidence to support it.

Considering the position that any association between the unemployment rate and mortality is due to the stressful effects of unemployment, recent Canadian attitudinal data strongly suggest that unemployment remains very salient as a potential stressor for most people. The best example is provided in the results of the Work Ethic Study conducted for the Department of Manpower and Immigration in 1973.(2) Choosing among work, church, family, friends and union as the means of attaining "the most important goals in life", 57% of the male and 40% of the female respondents selected work. The participants in this survey who were in the labour force clearly preferred work to unemployment. Asked for their reaction to the statements, "There are plenty of jobs that are available but I would rather collect Unemployment Insurance than work", and "I would like to work a little while and then get by on Unemployment Insurance", 95% or more of the sample disagreed with each (Burstein et al: 1975: 22). The authors conclude that the broad implications that work has carried for most people in the labour force are still present. "The importance of work in our lives goes well beyond economic survival or provision of discretionary income. Work allows us to meet people and make friends, and is a major determinant of social status. Moreover, work contributes to our self-esteem, and by providing us with socially useful and challenging tasks, it fosters the sense self-fulfillment" (Burstein et al: 1975: 61).

(1) Although a post-World War II discontinuity is indicated in a paper by Dear et al (1979) which correlates admissions to a psychiatric hospital in Hamilton with the unemployment rate for Ontario, 1960-1977. "Admissions are also significantly affected by unemployment and inflation. In the first case the relationship is inverse; as unemployment increases, admissions decrease (for example, a 10% increase in unemployment would induce a 2.1% decrease in admissions)" (Dear et al: 1979: 51).

(2) Personal interview survey of 1,978 Canadian males and females between the ages of 16 and 60.

In addition, the results of a national survey of attitudes towards the Canadian Unemployment Insurance program reflect a widespread social stigma against the unemployed.(3) "Another important area of belief about the present Unemployment Insurance Programme involves the abuses of the programme. The survey indicates that most Canadians believe the programme is abused in one or many ways."... "The most frequently mentioned abuse indicates that the UIC seems to assist recipients in 'sliding along' with an easy time of it" (Lanphier et al: 1970: pp. 35-36).

In summary, it is expected that a time-series analysis of Canadian mortality and unemployment rates including the Depression period would indicate the same positive correlation as the American data. Concentrating on the post-World War II period, although there is some disagreement about the American findings, Canadian data on attitudes toward unemployment indicate that it is widely perceived to be stressful.

Despite the cross-sectional evidence for an expected positive correlation between mortality and unemployment, the results of the major Canadian study to date that has employed a time series approach provide mixed support for this hypothesis (MacLeod: 1978).

This study comprised a time series regression analysis of selected mortality and morbidity rates on the rates of inflation, unemployment and per capita income, for Canada and regions, 1931-1974. The analysis was further subdivided into two time periods, firstly covering the entire span from 1931-1974, and secondly restricted to the post-World War II period, from 1955-1974. MacLeod reported several striking discontinuities between the two periods of analysis. Some examples are as follows:

"An increase in the unemployment rate brought about an increase in the suicide rate in all given regions when the 1931-1974 period was used. This corresponds to the conventional wisdom as to the link between these two phenomena. But when only the shorter period is used the direction of the effects is reversed in every region - in other words in the post-war period, the model estimates that an increase in the unemployment rate would be followed by a decrease in the suicide rate." (MacLeod: 1978: 358), and

"Unemployment also had a positive effect on the homicide rate over the longer period in all regions. But over the shorter period the effects were reversed in the Prairies and Ontario" (MacLeod: 1978: 360).

A comparison of the results between the two periods also presented seemingly counter-intuitive findings with respect to age-group (if we accept that those age groups with the greatest commitment to the labour force would be the most susceptible to the effects of unemployment).

"An increase in the unemployment rate brought about an increase in the mortality rate over 1931-1974 for people in all age groups except those 55-64 for whom it was negative, and those over 75, for whom it had no effect. In the post-war period it still increased with unemployment for the two youngest age groups but decreased with unemployment for the next two (35-44, 45-54) and increased with unemployment for the three oldest. The change in sign from positive to negative for the middle age groups may reflect the reduced burden of unemployment in the past 20 years due both to unemployment insurance and the increase in the relative number of multi-earner families" (MacLeod: 1978: 365).

In summary, the existing Canadian research does not appear to provide unequivocal support for either a positive or a negative association between unemployment and mortality, particularly, as MacLeod has found, in the period since the Second World War. It may be, however, that such a relationship may be confounded by demographic factors, such as age and sex, and also by cause of death.

Thus the objective of the present paper is to conduct a detailed examination of the unemployment/mortality association, by disaggregating the mortality rates, and also where possible, the unemployment rate. The time-period under consideration is the 28-year span from 1950-1977. In order to be comparable with the major body of the American evidence (i.e., Brenner: 1971a and Brenner: 1973) linear detrending will be applied to both mortality and unemployment rate series, and a lag of mortality behind fluctuations in the unemployment rate, of up to five years will be considered.

One point that should be noted before discussing the analysis, is that testing the association between morbidity and both synchronous and lagged values of the unemployment rate should not be interpreted as the study of illness causation and subsequent mortality.

Obviously, many causes of death, notably neoplasms, are preceded by long periods of latency, and furthermore, after many diseases are first diagnosed, many more years elapse before mortality. Clearly, mortality rates, essentially the only time-series health data available are an incomplete representation of incidence and prevalence. This is clearly

(3) At least those who are eligible for Unemployment Insurance.

shown in an examination of the relative importance of incidence to the combined incidence/mortality total (as reported in the Canadian Sickness Survey 1950-1951). In each case mortality represents only a fraction of the total (Text Table 1).

Thus it is not unreasonable to assume that any observed mortality/unemployment rate association could be decomposed into both an incidence and prevalence effect. Unfortunately, no longitudinal data exist in Canada that could clarify this relationship further.

The general form of the equation to be used for a test of the statistical association between mortality and unemployment is as follows:

$$m_t = a + B_0U_t + B_1U_{t-1} + \ldots B_5U_{t-5} + e$$

where m_t = mortality in year t
a = regression intercept
B = metric regression coefficients
U_t = unemployment in year t
e = error term

Data Used in Statistical Analysis

Unemployment

The principal measure of economic fluctuation used in this study is the average annual unemployment rate, as it is calculated from the responses obtained by the Canadian Labour Force Survey. The proportion of the labour force who are defined as "unemployed" by this survey includes these people, who, in the reference work prior to the survey, were:

"without work and seeking work, i.e., did not work during the reference week and were looking for work; or would have been looking for work except that they were temporarily ill, were on indefinite or prolonged layoff, or believed no suitable work was available in the community; or

were temporarily laid off for the full week, i.e., were waiting to be called back to a job from which they had been laid off for less than 30 days" (Statistics Canada: 1975a: 90).

The unadjusted unemployment rate is calculated by expressing the total of these two groups as a percentage of the labour force (note that the definition of unemployment has changed in the Revised Labour Force Survey. For a comparison of the revised and former Labour Force Surveys, see MacDonald (1977)).

Additionally, since much of the previous research implicitly assumes that the stress of unemployment is due to income loss, a measure of the annual average duration of unemployment for Canada has been calculated.(4)

One further consideration concerns the aggregation of the unemployment rate. For the full 28-year span the total unemployment rate was used, however, in order to consider the possibility that the use of an age-sex disaggregated rate might yield a different result, the analyses will be replicated for the subset of observations for which this breakdown was available. This corresponds to the years 1956-1977, for the following age groups (by sex); 14-19 (15-19 after 1965), 20-24, 25-44, 45-64 and 65+.

All of the unemployment measures and sources are given in Appendix A.

Mortality

As noted in the literature review, the unemployment/mortality association has been estimated on the basis of a widely varying group of sex-age-cause of death or region-specific death rates. Since this variance between studies has contributed to some of the inconclusiveness of the literature, all deaths in Canada between 1950-1977 are used in the analyses. The mortality rates are disaggregated by sex, age and cause of death. Age was collapsed into six categories, 0-14, 15-24, 25-34, 35-44, 45-54, 55-64, 65-69 and 70 years and over. Cause of death is coded into 14 groups, based on the 6th, 7th and 8th Revisions of the International Classification of Diseases. (The categories used, which are based on a reclassification of the 3-digit ICDA code, appear in Appendix B.) The deaths were further aggregated to calculate total death rates by sex and cause, and by sex and age. All rates were expressed in terms of a rate

(4) This calculation is as follows. For each point when the survey was taken, the volume of unemployment in each category of duration is multiplied by the appropriate midpoint (eight months was used for the open-ended interval of seeking work six months or more see Maki(1976)). These products were summed over each category of duration, and divided by the total volume of unemployment, thus yielding the average duration of unemployment (in months) for that point in time. Annual average duration of unemployment was then calculated from these quarterly or monthly (since 1952) values. The only exception to the above was the last three years of observation, when the two longest categories of duration were collapsed, (i.e., in 1974 these were unemployed and seeking work four to six months, and unemployed and seeking work six months and over; in 1975 this appeared as 14 weeks and over). For these last three years a value of seven months was assumed for this open-ended interval.

per 100,000 population. The death rates were calculated from tabulations of the Mortality Data Base of the Vital Statistics and Disease Registries Section of the Health Division of Statistics Canada, and from the revised annual June 1 population estimates (see Statistics Canada: 1979a) Missing data for age and cause of death were incorporated into their respective totals.

Psychiatric Morbidity

First admission rates, disaggregated by sex, were employed for four diagnostic categories; psychoses, neuroses, alcoholism, and total psychiatric first admissions. The psychiatric morbidity data were obtained from annual tabulations of first admissions, titled Diagnostic Class by Sex and Province, and published in **Mental Health Statistics, Volume I. Institutional Admissions and Separations** (Statistics Canada Catalogue 83-204). Using the same population estimates noted above, first admission rates were then calculated (rate per 100,000 population).

The age-sex-cause of death-specific death rates for Canada as a whole, for the period under consideration in this study, 1950-1977, appear in Appendix C. Similarly, the national total sex-diagnostic class-specific psychiatric first admission rates are printed in Appendix C.

Empirical Testing

Detrending

The initial step of the analysis was to fit a linear time trend to the unemployment, mortality, and psychiatric morbidity rate time-series. This equation was as follows:

$$m_t = a + Bt + e$$

where m_t = mortality in year t
a = regression intercept
Bt = metric regression coefficient
e = error (residual)
t = time trend taking on values 1 ... 28

TEXT TABLE I. Combined Estimate of Morbidity and Mortality 1951: Vital Statistics and Data from the Canadian Sickness Survey 1950-1951 by Selected Causes

	Neoplasms	Heart disease	Hypertensive disease	Influenza pneumonia and bronchitis	Digestive disease	Accidents and violence
	Actual number of deaths and disease episodes					
Deaths 1951	17,821	32,969	5,794	7,785	3,571	9,222
New illnesses 1950-1951	71,000	91,000	54,000	5,811,000	1,770,000	1,448,000
Total	**88,821**	**123,969**	**59,794**	**5,818,785**	**1,773,571**	**1,457,222**
	Percentage distribution of deaths and disease episodes					
Deaths 1951	20	27	10	0.1	0.2	0.6
New illnesses 1950-1951	80	73	90	99.9	99.8	99.4
Total	**100**	**100**	**100**	**100**	**100**	**100**

Note: In the case of heart disease, if the prevalence (permanent disability) of 18,000 persons were added to the total, the nearly 1/3 of the total volume of heart disease resulting in death would be further reduced to 11% of the total.

Source: Mortality Data, Table 18. Dominion Bureau of Statistics (1954). Morbidity Data, Table 9. Dominion Bureau of Statistics (1960b).

The purpose of this was to remove the effects of long-term trends that were evident in these series between 1950 and 1977.(5)

From these regression equations, metric residuals were retained in order to facilitate comparison of the strength of the unemployment rate/mortality association across sex, age, and cause of death categories.

Input to the Regression Analysis of Mortality and Morbidity Rates on the Unemployment Rate

To summarize the first step of the analysis, the input to the multiple regression of mortality/morbidity on the synchronous and lagged values of the unemployment rate comprises the series of metric residuals of these rates that remained after the linear trend was fitted to each series.

In order to test the hypothesis that mortality fluctuations are lagged behind fluctuations in the unemployment rates, five new variables were created, representing the unemployment rate lagged from one through five years. Altogether, six unemployment regressors, the synchronous value of the unemployment rate and the five lagged values were considered as potential predictors of mortality in the multiple regression equations. Because of the reduced sample size, owing to the loss of one year's data for each year of lag, a restriction was placed on the number of variables entering the regression as predictors of the mortality and morbidity rates.(6)

(5) This approach has been criticized by Kasl (1979). "...the Brenner-type analysis performs various statistical adjustments on the raw data - such as removal of trends ... so that one can no longer tell what the residual phenomenon is which is being studied in relation to the business cycle or how large it is." (Kasl: 1979: 785). While Kasl's point is well taken detrending has been employed because the studies for the post-war period which tend **not** to employ detrending find auto-correlation to be a problem, and also to be comparable with the majority of earlier American research. Refer back to footnote 3 in Chapter 1 for Cohen and Felson's discussion of Brenner, and see also Land and Felson (1977: pp. 349).

(6) The difference between this method and other post-war studies is that they do not detrend the data. Their regression equations are attempting to explain much more variance, therefore the F-ratio calculation is less sensitive to the relatively few degrees of freedom. Detrending has the effect of reducing the SS due to regression. The restriction placed on the variables entering the equation was an F value corresponding to the .05 level of probability.

The results obtained for Canada as a whole will be discussed in detail below. The results of the regression equations are presented in Table 1.

Mortality and Unemployment: Canada Totals

At the national level, 270 mortality rates, representing different categories of sex, age, and cause of death (and their respective totals in the case of age and cause of death) were regressed on the synchronous and lagged values of the unemployment rate. Of those equations tested, 132, approximately 50% were significant at or beyond the .05 level of probability.

It is apparent from Table 1 that the results of these regression analyses do not bear out the expected findings that could most reasonably be formulated from the existing cross-sectional evidence.

Male mortality rates are only marginally more likely to be related to unemployment than are female rates. Considering age-groups, the categories 35-44 and above are the most likely to be related to unemployment. It should be noted that the equations for mortality rates of males in the 25-34 year-old category, the age range during which labour force participation reaches its maximum are among the least likely to be related to unemployment.

Traffic accident mortality rates are the most likely to be related to unemployment. Virtually all of the age-sex-specific traffic accident mortality rate equations were significant at a point beyond the .05 level of probability.

For males, the next most frequently observed associations were for cirrhosis of the liver, suicides, non-traffic accidents and diseases of the arteries.

The significant equations for cirrhosis of the liver and diseases of the arteries were concentrated in age groups 35-44 and above, whereas those for non-traffic accidents and suicide were observed most frequently at younger ages.

Homicide was observed to be related to unemployment for males in the age range 15-54. Heart disease was related to unemployment in age groups 35-44 to 55-64 and also for the 70 years and over age group. Age-specific rates for causes of death such as digestive disease and genito-urinary disease were less frequently related to unemployment.

A similar result was observed for cause of death-age-specific mortality rates for females. After traffic accident mortality, suicide, non-traffic accidents and respiratory disease mortality was found to be related most frequently to unemployment.

A pattern of association of these causes by age group is much less evident among the female mortality rates. Respiratory disease associations are concentrated in age groups 35-44 to 55-64, while those for suicide and non-traffic accidents are evenly dispersed throughout the age range. The next most frequently observed associations for females are those for cirrhosis of the liver, heart disease and diseases of the arteries.

Significant cirrhosis of the liver mortality associations were observed most frequently in the middle of the age group range, while those for heart disease mortality were concentrated in age groups 55-64. Diseases of the arteries mortality was more evenly dispersed. Mortality rates for other causes of death were significantly related to unemployment for only two or three age groups.

Direction of the Relationship

The direction of the mortality/unemployment rate association may be determined by examining the sign of the regression coefficients (B) shown in Table 1 (in the case of equations where more than one unemployment regression is significant, Brenner has summarized the direction of the association by taking the sum of the standardized partial regression coefficients, however, this occurred infrequently among these results and therefore was not considered necessary).

This examination provides the most direct indication that the results run counter to the hypothesis of a positive association between mortality in unemployment.

Among the significant equations, a negative association between mortality and unemployment is observed by a substantial majority. Indeed, the only cause of death which is consistently positively related to unemployment is heart disease. Among other causes of death, positive associations are the exception rather than the rule. Across age categories as well, inverse relationships are observed just as frequently among age groups with the greatest attachment to the labour force.(7)

Strength of the Association

The magnitude of the mortality/unemployment rate association may be compared across the age-sex-cause of death-specific equations by examining the size of the metric regression coefficients shown in Table 1 (these are expressed as changes in the mortality rate per 100,000 population, in response to a unit change in the unemployment rate (this unit would be a percentage point increase in the unemployment rate, as metric residuals were retained for this as well)).

These metric coefficients are similar to those that were used by Brenner to obtain his dramatic predictions about the increased number of deaths occasioned by an increase of 1% in the unemployment rate. (The predicted number of deaths being equal to the product of the regression coefficient and the size of the population at risk) with the exception that residual values of mortality and unemployment are employed for the regression analyses in Table 1.

It is evident in Table 1 that there is considerable variability in the size of the regression coefficients for the unemployment rate regressors. The range in the size of these coefficients extends from less than one death per 100,000 population to 62 per 100,000.

In general, stronger relationships are observed for male mortality than for female mortality rates. For males, the strength of the relationship is greatest among those causes of death that are most frequently observed among the significant equations.

Among the cause of death categories the greatest fluctuation in mortality in response to change in the unemployment rate is observed for heart disease. The value of the regression coefficient of unemployment for the 70 years and over male mortality rate is approximately an increase of 48 deaths per 100,000 in response to a unit change in unemployment (at a lag of five years).

A more typical value of the regression slope is approximately two deaths per 100,000 population. An association of this magnitude is observed for traffic accident and cirrhosis of the liver mortality. Much smaller coefficients are observed for causes such as suicide and homicide mortality. A more precise comparison across cause of death and age categories would require an examination of the relative importance of each of the mortality series in accounting for overall mortality during the period of observation of this study, a task which extends beyond the scope of this paper. Among the female mortality rates, the coefficients for heart disease were in a similar order of magnitude to those observed for males, although for other causes they are much smaller. As noted above, (for cause of death) for a more fundamental comparison of male-female differences, we would need to consider the size of these regression coefficients in

(7) As inferred from the labour force participation rate.

relation to the original variation(8) of the undetrended mortality rate series. If we consider just the variation in mortality that is indicated among the residuals, then the unemployment rate is a better than modest predictor of mortality, as evidenced by the R^2 coefficients. For the cause of death specific mortality rates most frequently observed to be significantly related to unemployment, typically one third of the variance is accounted for by unemployment among male mortality rates. A much wider variation in these coefficients is observed among female mortality rates. It must be emphasized however that these R^2 coefficients refer only to the variation in mortality **residuals**. In most cases, the proportion of variation of the original **undetrended** mortality series explained by unemployment would be much less. (This would be inversely related to the strength of the time trend association.)(9)

Form of the Lagged Association

In a majority of the equations shown in Table 1, only one of the unemployment regressors was a significant predictor of mortality at or beyond the .05 level of probability. The most frequently observed unemployment values were those representing the lagged value of the unemployment rate at a lag period of either four or five years.

The most noticeable exceptions to this trend are the equations for traffic accident mortality. In all but one instance, it is the synchronous value of the unemployment rate that is most highly correlated with traffic accident mortality.

Among a small proportion of the equations two or three unemployment regressors are significant. The most frequently observed combinations are the synchronous value of the unemployment rate with the lagged value of either four or five years. Such an examination is not conclusive of course as a lag length of only five years has been considered.

(8) One basic approach would be to compare the regression coefficient to the standard deviation of the original mortality rate series.

(9) A parallel is found in studies which do not employ detrending methods but include other likely predictors as variables. One such study which replicates Brenner's homicide rate results, with the addition of three variables - percentage of males aged 15-24, percentage of males in the military, and the execution rate for murder, finds that the unemployment rate is no longer significant (Hoover Institution: 1979).

Serial Correlation

Despite the fact that all of the mortality series and the unemployment rate were detrended, it is evident that serial correlation among the residuals remains a problem among a considerable number of the equations shown in Table 1.

In only a minority of cases is the Durbin-Watson statistic above the level required to fail to reject the hypothesis of zero serial correlation.

This is not surprising since in most cases only one unemployment regressor was entered into the equation. Other strategies that could no doubt be taken to reduce the level of autocorrelation would be to relax the restriction on the number of unemployment variables entering the equation, or else to consider additional variables as predictors of mortality. (See for example, the wide array of variables studied by Land and McMillan (1980), including factors of lifestyle (cigarette and liquor consumption) and social and economic organization (public health expenditure and number of physicians per capita).)

Psychiatric Morbidity and Unemployment

Among the eight psychiatric first admission rates representing the Canadian totals, five were significantly related to unemployment at or beyond the .05 level of probability (Table 1). Both male and female first admission rates in the psychotic category were related to the unemployment rate at a lag of one year. The direction of these relationships was positive, and the regression slope was 1.6 in both cases (measured as an increase in admissions per 100,000 population). The first admission rate for the neuroses class of admissions was significantly related to unemployment for females only and was observed to be negative. First admission rates for alcoholism and total first admission rates were significantly related to unemployment for males, but not for females.

Regression Results for Annual Average Duration of Unemployment

Introduction

The unemployment rate, the measure of the total volume or "prevalence" of unemployment is the product of "incidence" - the numbers of newly emerging unemployed, and duration - the length of the unemployment period. As was discussed earlier in this paper, an implicit assumption found in much of the literature has been that it is the degree of economic

hardship occasioned by unemployment, rather than the **event** of unemployment per se that brings about stress and morbidity/mortality outcomes. If this is the case, does the variable representing average annual duration of unemployment serve to clarify the inverse associations observed between the unemployment rate and mortality?

In a manner similar to that described above, the residuals of the mortality rates, aggregated at the Canada total level, were also regressed on the residuals of annual average duration of unemployment for Canada. As was the case for the unemployment rate regressions, six average duration variables were considered as potential predictors of mortality, the synchronous value and the lagged values of one to five years.

Regression Results: Mortality Series on Average Duration of Unemployment-Canada

The equations from the regression of mortality on average duration of unemployment are shown in Table 2.

From these equations it may be seen that mortality is considerably less likely to be related to average duration than to the total unemployment rate. Of the potential 270 equations, approximately one-third were significant at or beyond the .05 level of probability.

Among these equations, female mortality rates were marginally more likely to be related to average duration than were male mortality rates.

Significant differences between the two unemployment measures are evident in a comparison of the pattern of associations by cause of death. Among the traffic accident mortality equations that were tested, only two were significant. For the males, suicide and non-traffic accident mortality rates were the most likely to be related to average duration. Among the female mortality rates significant relationships were observed most frequently for digestive disease, suicide, and heart disease mortality. There does not appear to be a concentration of significant equations in any particular age group range.

Direction of Association

The direction of the relationships of the average duration/mortality association remains essentially identical to those obtained using the unemployment rate. For males, the significant heart disease equations have positively signed average duration coefficients. All of the significant suicide and non-traffic accident mortality equations, however, were inversely related to average duration.

The significant equations for the remaining causes of death were largely inversely related to average duration for males, with a few exceptions, for example, traffic accident mortality in the 35-44 year-old age group. A similar pattern in the sign of the average duration coefficients is observed for females. In the case of the heart disease mortality equations, however, the death rates for the 35-44 and 45-54 year-old age groups are observed to be inversely related to average duration. Among the other causes of death the majority are also inversely related to average duration.

Strength of the Association

In general, average duration is not as highly correlated with mortality as was the unemployment rate. The values of the metric regression coefficients are somewhat smaller, with the exception of heart disease mortality, where they remain the same or are somewhat greater. This tendency towards a weaker association in the average duration/mortality equations is more readily observed by examining the values of the R^2 coefficients. Whereas in the case of the unemployment rate/mortality regressions the value of R^2 was frequently observed in the .30-.40 range, among the average durations R^2 coefficients in the range of .20-.30 were more typical.

Form of the Association

Among a majority of the significant average duration equations, only one of the average duration regressors were significant. As was the case for the unemployment rate, significant coefficients were most frequently observed for average duration at its lagged values of four and five years.

Serial Correlation

Here again, the values of the Durbin-Watson statistics indicate that serial correlation among the residuals remains a problem. There does not appear to be a pattern of this serial correlation across cause of death categories. For males however, the mortality rate equations for age groups 45-54 and above are somewhat less likely to have significant serial correlations than are younger age groups. For the females, however, serial correlation was somewhat less likely to be observed for age groups 35-44 and below.

Regression Results: Psychiatric Morbidity on Average Duration of Unemployment: Canada

Of the eight psychiatric morbidity rates regressed on average annual duration of unemployment, only three were significantly related to average duration at or beyond the

.05 level of probability (Table 2). Both male and female first admission rates in the psychotic class are positively related to average duration, and the first admission rate for males in the alcoholism class is inversely related to average duration.

In each of these three equations the synchronous value of average duration was the most highly correlated with the first admission rate. The values of the Durbin-Watson statistics indicated that serial correlation remained present in both psychotic first admission equations, while the alcoholism admission rate remained in the inconclusive range.

Summary

The regression of the residual series of mortality and psychiatric morbidity rates on the residual variation in average annual duration of unemployment has largely confirmed the results obtained with the unemployment rate. Although some differences were observed in the pattern of associations by across cause of death categories, the most significant consideration, the sign of the average duration regression coefficients, strongly supported the unemployment rate findings.

Inverse associations between mortality and average duration were observed in a majority of cases, the most notable exceptions being heart disease mortality and psychiatric first admissions in the psychotic class.

Finally, before discussing some possible explanations for the predominately negative relationship that was observed between unemployment and mortality during the 1950-1977 period, it should be added that several alternative approaches were considered, in which the regression analyses of mortality were repeated under different specifications of the basic model. None of these approaches made an appreciable difference with regard to the overall direction of the association. These alternatives are outlined briefly below:

- Instead of subtracting the linear trend from the mortality and unemployment rates, first differences were calculated for all series, and these were then used in the regression analyses.

- To account for the possibility of discontinuity in the unemployment rate series from 1966 forward (no subsequent revision was made to the pre-1966 estimates, see Statistics Canada (1979b, 17)), the detrending equation for the unemployment rate was run again with the inclusion of a dummy variable representing the post-1966 period, in addition to the time trend.

- The age-sex-specific unemployment rates were applied to the appropriate age-sex-specific mortality rates (see Appendix A), for the period 1956-1977.

- It has been suggested that the employment/population ratio, calculated as the ratio of the number of persons employed to the total population, has certain advantages over the unemployment rate, i.e., "the criteria for identifying an employed person in the Labour Force Survey are more straightforward and less complicated than is the case with persons who are unemployed or not in the labour force" (Wong:1978:7). Accordingly, the detrended E/P ratio was substituted for the unemployment rate (positively signed coefficients were obtained in this case, which would be expected in that this ratio is essentially the obverse of the unemployment rate).

- All series were left undetrended and a time trend variable was included in the regression equations.

In addition to these alternatives noted above, the effect of a longer lag period was considered as well. The unemployment rate and its lagged values of up to 10 years were correlated with all of the mortality and morbidity rates. An examination of the correlation matrix indicated that the majority of all correlations were inverse and that the strongest correlation between mortality/morbidity and unemployment was observed most frequently at a lag of six years. It must be emphasized, however, that this examination is constrained by the small number of observations.

CHAPTER 3

DISCUSSION OF RESULTS AND RECOMMENDATIONS

Introduction

In general, the mortality and psychiatric morbidity rates have been found to be inversely related to unemployment during the period 1950-1977. While there are several departures from this trend, the only series which tend to be positively related to unemployment are heart disease, and psychiatric first admissions in the psychotic,(1) category. Clearly, these results contradict the findings of cross-sectional studies and the results presented in Brenner's report for the Joint Economic Committee.(2) Viewed against the conception of the stressful effect of unemployment as it has been posited in the literature for at least a century, it would appear that these results pose an interpretative dilemma.

The principal question implied by the majority of inverse relationships is: How is it that mortality is inversely related to unemployment? A secondary question would be; having observed that most of the mortality rates are inversely related to unemployment, why, for a few causes, is mortality positively related to unemployment?

Explanations of the Inverse Relationships

It is likely that there are several explanations that could account for the observed inverse relationship. A few are listed below.

- The use of the unemployment rate as an indicator of economic hardship during the 1950-1977 period is erroneous. Although it has been shown that average duration is positively related to the unemployment rate, it may be, that during this time period, the unemployment rate is more strongly related to its incidence component. If this were the case, the unemployment rate would be largely due to high volume of short-duration unemployment. More particularly, the unemployment rate could be most heavily determined by young workers entering the labour force.

- The observed negative relationship between the mortality rates and the unemployment rate is an artefact of the cyclical nature of the unemployment rate. This possibility has been the basis for the debate between Eyer and Brenner over whether a lagged positive relationship is in reality a synchronous negative relationship.

- The relationship between unemployment and mortality could be spurious because of the influence of a third variable that is correlated with both unemployment and mortality.

- The societal activity hypothesis is accounting for the inverse association. This is to say that unemployment is only indicative of the total volume activity in society. For example, the inverse association between traffic accident mortality and unemployment is due to the fact that as unemployment increases, vehicle traffic decreases, thus resulting in fewer fatalities.

- The relationship between mortality and the unemployment rate could be spurious because it has been mis-specified as regards its theoretical formation. This is to say that the emphasis should be on the upturn side of the economy and its implications for increased mortality. Such a possibility would be underscored by the finding that the unemployment rate is most heavily determined by the duration component.

The plausability of these alternative explanations is discussed below.

Components of the Unemployment Rate

Those who have argued the case for a positive relationship between unemployment and mortality have emphasized the "economic distress" aspect. "Put directly, the fear, or

(1) As this trend is inferred from the summarization of the results of the two sets of 278 equations regressing mortality and morbidity rates on the total unemployment rate and average duration of employment.

(2) This is to say that they contradict those obtained by using the fitted time trend for per capita income.

actuality of loss of income or employment is a profound source of frustrations and a potential source of major loss" (Brenner: 1977b: 584). It may be however, that the meaning of unemployment has changed since the Second World War. One popular explanation has been that job creation has not kept pace with labour force growth. Another has been that a certain fraction of the unemployment rate is induced by unemployment insurance programs.

A superficial time-series analysis of the components of the United States unemployment rate 1950-1975,(3) shown in Appendix D, does not support the notion that the total volume of unemployment is determined by its incidence components. Average duration of unemployment is the strongest correlate of the unemployment rate, both at the level of the simple correlation and in a multiple regression equation together with the measures of incidence. This reinforces the finding that the mortality rates are inversely related to average annual duration of employment, in a majority of cases.

However, it has also been argued that long periods of unemployment have a different context as well, due primarily to unemployment insurance programs. Under conditions of generous unemployment insurance benefits workers can afford to be selective, thus remaining unemployed for longer periods of time. Some support for this is claimed by econometric studies which report a positively signed coefficient for the effect of the ratio of Unemployment Insurance benefits to average weekly wages, on the average duration of unemployment (Maki: 1976).

While it may be that Unemployment Insurance mitigates the economic impact of unemployment to some extent, it cannot be assumed that unemployment no longer entails economic hardship or loss.

At the micro-level, the previously cited Toronto Area Employment study reported that, "the length of unemployment has a direct influence on the people's income. People with very short spans of unemployment generally are up scale in the income categories, whereas those with longer periods of unemployment were at the lower end of the income scale"(Canadian Intermark:1972:61).

An aggregate measure of income loss, for the purposes of time series analysis, is more difficult to obtain. However, a short series has been compiled from taxation statistics consisting of the annual percentage changes in income for identical individuals from 1966-1967 to 1976-1977. When this series is correlated with the corresponding percentage changes in the unemployment rate, an inverse relationship is observed, although the correlation is only significant for the < 25 age group, owing to the small number of observations. (Appendix E.)

In summary, the available evidence suggests that we may discount the explanation for the observed inverse relationship between mortality and both the unemployment rate, and average duration of unemployment for reasons such as that the unemployment rate no longer represents lengthy periods of being without work and ensuing economic hardship.

This is reinforced by the observation that the quit rate is inversely related to the unemployment rate in the United States over the period 1950-1975. (See Appendix D.)

Length of the Lagged Association

As discussed earlier, the relationship between mortality and unemployment rate is most frequently observed when the unemployment rate is lagged by four or five years. Insofar as the unemployment rate tends to be cyclical, however, it may be that the negative relationships between mortality and unemployment are an artefact of the serial correlation characteristics of the unemployment rate. In effect this would be the obverse contention to the Eyer-Brenner debate, as summarized by Eyer "Since the economic fluctuations that he studies average about five to six years in length, it is easy to see that the use of three-year lag can convert a relation that moves directly with unemployment to one that moves inversely with it" (Eyer: 1976: 145).

Thus in the present case the negative lagged relationship between the unemployment rate and mortality would really reflect a synchronous positive relationship between mortality and the upturn in the business cycle.

This is illustrated by the correlations of the Canadian unemployment rate with its lagged values. (Text Table II.)

The unemployment rate is negatively related to itself at the lag of five years, although the maximum negative correlation probably occurs at a lag of six or seven years. (In fact, the use of a 10-year lag in the unemployment rate indicates that the maximum inverse correlation between the synchronous value of the unemployment rate and the lagged value occurs at a lag of eight years ($r = -.56$) although this correlation was based on only 18 observations.)

(3) United States data were employed because of additional information on quits and layoffs and a longer separation rate series.

TEXT TABLE II. Correlations: Present Value of the Unemployment Rate(1) With Its Lagged Values

	Lag_0	Lag_1	Lag_2	Lag_3	Lag_4	Lag_5
Lag_0	-	.722	.424	.220	- .032	- .247
N = 23						

(1) Canadian Unemployment Rate 1950-1977 - detrended.

While the lagged correlations do not suggest such an interpretation further evidence that it is unwarranted is indicated by an examination of the relationship between the direction of the association and the length of the lag period among the mortality rate regression results for Canada. (Text Table III.)

To take the case of the equations where one unemployment regressor was significant the direction of the association is most likely to be negative at both the synchronous level and all five years of lag. Such an explanation would therefore be rejected on the same grounds that Brenner used to discount Eyer's interpretation as follows, "However, when this interpretation was tested on U.S. data by statistical methods, the unemployment rate did not consistently show a negative simple correlation with the mortality-rate; usually the relation was positive even at zero lag, and, at lags of two to ten years, the relation was consistently positive and significant" (Brenner: 1979:569).

TEXT TABLE III. Direction of Association by Length of Lag-Regressions with One Signicant Predictor (Mortality on the Unemployment Rate, Canada)

Direction of association	Length of lag period (years)						
	0	1	2	3	4	5	Total
	per cent						
Negative	94	67	60	87	78	82	79
Positive	6	33	40	13	22	18	21
Total	100 (16)	100 (12)	100 (10)	100 (8)	100 (32)	100 (33)	100 (111)

Thus the observed negative relationship between mortality and unemployment does not appear to be explained away as purely an artefact of the peak-trough characteristic of the unemployment rate.

Intervening Variables

This line of reasoning argues that the direct relationship measured between unemployment and mortality would be spurious and could be accounted for by the relationship between unemployment and some intervening variable that would be injurious to health. The most frequently cited "third" variables are life style practices, notably smoking and drinking. It is generally held that these behaviors become manifest as "coping mechanisms" in response to stress. To take the case of alcohol, Brenner wrote, "abuse of alcohol to the extent of serious morbidity (and in fact mortality) would be indicative of the general tendency to utilize anesthetizing and tranquilizing psychotropic drugs to ease the sense of anxiety, tension, and depression" (Brenner: 1977b: 586).

Eyer has also agreed with this stress - response formulation, adding cigarette smoking and the assertion that stress reaches a maximum with the peak of the boom; "if we see alcohol as a drug of adaptation to or escape from work and disrupted life and if these problems are most severe at the peak of the business boom... Both alcohol consumption and cigarette smoking clearly have a tendency to peak with the boom, despite peak-for-peak discrepancies or amplitude of variation problems" (Eyer: 1977: 137).

To explore the possibility that these behaviors are related to the unemployment rate, two series were compiled for Canada, over the period 1950-1975, i.e.,

expenditures on alcoholic beverages per capita; and

expenditures on tobacco products per capita.(4)

The series were first detrended. As would be expected from expenditure data, there is a strong secular component in these series. The time trend accounted for 83% of the variation in per capita expenditure on alcohol and 94% of the variation in expenditure on tobacco products.

Assuming that unemployment is temporally prior to fluctuations in these variables, the residuals from the detrending equations were correlated with the synchronous and lagged values of the unemployment rate.(5) The correlations are shown in Text Table IV.

As shown in Text Table IV of correlations the relationships between the consumption variables and the unemployment rate are dissimilar. Expenditure on alcohol is negatively related to unemployment at a lag of five years behind the unemployment rate. Expenditure on tobacco is positively related to unemployment at each period of lag beyond two years, with the largest correlations occuring when the expenditure series is lagged at three and four years behind the unemployment rate.

Interpretation

It should be noted that these results can only account for the unemployment/mortality relationship in a statistical sense. If we assume that the relationship between these consumption behaviours and mortality is synchronous, then expenditure on tobacco, positively related to unemployment, could account for the positive association between unemployment and heart disease mortality fluctuations.

(4) Calculated as personal expenditure in constant (1971) dollars/June 1st estimate of Canadian population. Source of expenditure data: **National Income and Expenditure Accounts, Volume 1. The Annual Estimates 1926-1974** (Statistics Canada: 1976).

(5) Detrended.

TEXT TABLE IV. Correlations Between Synchronous and Lagged Values of the Unemployment Rate and Per Capita Expenditure on Alcoholic Beverages and Tobacco Products, Canada 1950-1975

		Lag value of the unemployment rate (years)					
		(0)	(1)	(2)	(3)	(4)	(5)
Per capita expenditure on alcoholic beverages	R	0.0587	- 0.0419	- 0.0682	- 0.1534	- 0.3408	- 0.4745(1)
Per capita expenditure on tabacco products	R	0.2128	0.3231	0.4729(1)	0.6236(1)	0.6598(1)	0.3791(1)

(1) Denotes that $p < .05$, $n = 21$.

Similarly, the inverse relationship between expenditure on alcohol and unemployment might explain the negative association between cirrhosis of the liver mortality and unemployment. However, such results tell us nothing more than that it appears to be erroneous to classify alcohol and tobacco consumption together as responses to stress occasioned by unemployment, at least at the time-series ecological level of measurement.

In summary, while the relationships between expenditures on alcohol and tobacco and unemployment might serve to account for the cirrhosis of the liver and heart disease mortality fluctuations in a **statistical** sense, such an examination does not explain why these two variables are oppositely related to unemployment. More importantly, the intervening variable explanation does not account for the majority of negative relationships observed for other causes of death, particularly suicide and homicide.(6)

One other explanation that has been put forth as an intervening variable interpretation of the business cycle/mortality relationship is the migration-stress hypothesis.

(6) Although it should be noted that alcohol has been implicated in other causes of death, notably motor vehicle accidents.

As described by Eyer, "Migration with its attendant uprooting from communities in the workplace, neighbourhood and family, is an important source of stress and is associated with increased disease risks... migration rates continue to peak with the boom of the business cycle" (Eyer: 1977: 133). While it may be the case that international migration varies directly with the business cycle (see Higgs (1979)), the immigration component of migration reflects only a small proportion of the mobility of the population. For example, in the 1961-1962 period immigration represented only 23% of the combined migration and inter-provincial migration total in Canada. In order to investigate the explanation that population mobility varies inversely with the unemployment rate, thereby accounting for the inverse mortality/unemployment relationship, a series representing the interprovincial migration rate was calculated from the available data.(7) This series was then correlated with the average annual unemployment rate for each year of the migration period, as well as the first difference in average annual unemployment, since population movement between two years is more likely to be related to changing levels of unemployment rather than the values at either end of the period.

The correlations are shown in Text Table V.

(7) Interprovincial migration data pertain to the period between June of one year and May of the next, for the years 1961-1962 to 1977-1978. The interprovincial migration rate is calculated as the sum of all interprovincial migration divided by the average population between June of one year and June of the next year (see Statistics Canada: 1979c).

While the migration rate is inversely related to both of the annual average unemployment rates, it is positively related to the first difference, although the correlation is insignificant (owing to the small number of observations). In that the first difference corresponds most closely to the population movement from the middle of one year to the middle of the next, we cannot accept, with confidence, the migration-stress hypothesis as an explanation for the mortality/unemployment results.

Unemployment as a Summary Indicator of Societal Activity

As noted earlier, this interpretation has been advanced by Land and McMillen to account for the inverse association that they observed between unemployment and both respiratory disease and traffic accident mortality in the 1946-1972 period. Assuming that, "a decrease in economic activity implies a lower rate of social interaction in the population, and that a decline in the rate of interaction implies a lower rate of spread of influenza viruses (and deaths) among the members of the population, we are led to expect a negative net relation of the respiratory diseases mortality to the unemployment rate ... During an economic downturn a decreased level of business activity should reduce the amount of commercial vehicle traffic, and it may result in a decline of non commercial traffic as well" (Land and McMillen: 1980:pp.26 and 35).

Although the immediate inverse relationship that was observed between motor vehicle traffic accident mortality and unemployment in

TEXT TABLE V. Correlations: Interprovincial Migration and Unemployment Variables(1), Canada, 1961-1962 to 1977-1978

	Interprovincial migration rate
U1 - Unemployment rate First year of migratory period	- .7966(2)
U2 - Unemployment rate Second year of migratory period	- .6644(2)
UDIF - First difference of U1 and U2	.3571

N = 17

(1) The unemployment variables were detrended. The interprovincial migration rate did not have a significant trend component.
(2) Denotes $p<.05$.

Canada appears to support this reasoning, that for respiratory diseases was observed most frequently at a lag of four or five years behind the unemployment rate.

Moreover, a comparison of the most recently available national traffic fatality statistics with the results of the National Driving Survey (see Stewart:1981) indicates that traffic fatalities are less likely to occur during the periods of peak traffic volume. In 1976, 25% of the fatal motor vehicle accidents in Canada occured between midnight and 8 a.m. A further 17% occured between 9 p.m. and midnight. (See Table 5 (Statistics Canada: 1980a)). By comparison, the results of the National Driving Survey, conducted in 1978-1979, showed that these two-time periods accounted for just 12% and 8% of the annual kilometres driven in Canada (representative of vehicles with engine sizes 50 c.c. or larger, and other vehicles with a Gross Vehicle Weight of less than 10,000 lb. Source: unpublished data from the National Driving Survey). Similarly, considering day of the week, 22% and 16% of all fatal accidents occurred on Saturday and Sunday, in comparison to 14% and 12% of annual kilometres driven on these days.

Although driving conditions undoubtedly account for some of the increased likelihood of accidents at night, a more frequently cited factor is driver impairment, usually due to alcohol. Turning again to the traffic accident statistics, in 1976, driver impairment was observed among 26% of all fatal accidents. Thus, while decreased total traffic volume as a result of unemployment might account for the observed inverse association over the 1950-1977 period, it would be necessary to consider the extent to which alcohol and other drugs contribute to traffic fatalities, and how these factors vary over time.

Mis-specification of the Basic Relationship

If one were to be convinced that the inverse relationship between mortality and unemployment is not accounted for by some artefact of measurement or method, it becomes necessary to question the basic hypothesis of unemployment - stress - morbidity/mortality.

Can it be that some aspect of the improvement of economic conditions is associated with an elevated risk of mortality?

Mortality as a Result of Economic Growth?

One interpretation of the inverse association between mortality and the business cycle (as measured by the unemployment rate) has been suggested by Brenner. His more recent work has emphasized the implications of economic growth for health. In the surge of activity after a recession, he has reasoned that "rapid economic growth is harmful for specific minorities particularly those who have suffered economic loss and are attempting to become integrated into the economy, especially during a time when other workers will be gaining significantly in income. It is also a period of rapid introduction of new technologies which produces a higher risk of accidents and the threat of job loss or demotion in the process of industrial reorganization" (Brenner: 1979a: 570). In fact, he has cautioned that the adoption of the new microprocessor technology will be a significant source of this form of stress (Brenner: 1979b: 672).

The basis for this argument is that economic growth occurs unevenly. However, neither the measures used to test this hypothesis nor the results obtained are particularly compelling. In a study based on data for England and Wales for the period 1936-1976, rapid economic growth was measured as residuals from the fitted trend in per capita income; and annual changes in the rate of growth of per capita income.

From the results Brenner reported "The rapid-economic-growth variables are weakly related to mortality; the residual from the long-term economic growth-rate shows no statistical significance, while the annual growth-rate shows significance for the population aged 10-44" (Brenner: 1979a: 570).

If we can set aside the considerations of statistical inference for a moment, there is an additional problem in that the measures of economic growth are inversely related to mortality in age groups over 45, the groups that Brenner predicted would be most likely to suffer the greatest stress in a period of economic upturn (Brenner: 1979a: Table 1).(8)

Such results and interpretation appear evenmore tenuous in light of the Canadian findings. The assumption that an aggregate measure of economic progress such as per capita income, implies **relative** lack of progress of decline for some **subgroups** cannot be used to account for the majority of inverse associations observed between mortality and unemployment in the Canadian case.

Income Inequality and Health

The problem associated with the use of per capita income measures in the context described above is that they may or may not reflect the unevenness of economic growth that is assumed by Brenner to accompany the upturn in the business cycle. The meaning of relative economic growth has been summarized by Brenner as follows. "The relational system, once

(8) The increased sensitivity of older age groups to stress during the upturn in the economy is implied by Brenner's suggestion that some workers will be forced into early retirement (Brenner:1979a: 569).

again, is key. It is difficult to understand the individual's "absolute" position in the society without reference to other people. An individual may have a promotion, for example, but if many others in the same firm were simultaneously promoted, then the promotion may not signify significant relative advancement. All of these types of questions require relative resolutions, and the entire relational context must be taken into account" (Brenner: 1979c: 79).

Since a variable such as per capita income is only a summary measure of the total volume of economic activity, in order to tap the "relational context" as discussed by Brenner, this total volume of activity must be disaggregated further.(9)

One common approach that has been taken to study differential or "relative" economic progress uses summary statistics that measure changes in the distribution of income rather than absolute levels. These statistics are generally referred to as measures of "income inequality". Probably the most commonly used measure of income inequality has been the Gini Coefficient, a statistic which provides a summary measure of the differences between all pairs of incomes.(10)

It appears that the use of the Gini Coefficient as a predictor of mortality has only been previously tested at a cross-sectional level, owing to the lack of time-series data on income distributions. In two studies of the former type that were located, results obtained from the use of the Gini Coefficient were impressive in comparison to those obtained from the unemployment rate.

The explanatory power of income inequality relative to that of unemployment has been shown by Krohn (1976) in a cross-national analysis of inequality, unemployment, and crime. In a multiple regression analysis predicting the homicide rate, the magnitude of the beta coefficient for the Gini Coefficient was approximately five times as great as the beta for the unemployment rate. (Both were positively signed.) (Krohn: 1976: 310). The results of a similar cross-national analysis, in which life expectancy was used as the dependent variable also provide strong support for the predictive power of the Gini Coefficient in addition to the effect of mean income (Rodgers: 1979).

After trying several specifications of his model, Rodgers concluded, "The most striking result is the consistent significance of the income distribution variable ... the sign of the income distribution terms was always as expected - greater inequality being associated with higher mortality. The results of life expectancy at birth suggest that the difference in average life expectancy between a relatively egalitarian and a relatively in egalitarian county is likely to be as much as five to 10 years" (Rodgers: 1979: 350).

One longitudinal approach that has been applied to the study of relative income has been taken by Richard Easterlin, originating with his studies of fertility. Easterlin has hypothesized that the relative size of the birth cohort determines the extent to which the aspirations of the members of this cohort, as they move through the life cycle, will be satisfied. The most appropriate relational context, Easterlin assumes, is that of this cohort's parents. This argument has occasioned lively debate among researchers of the determinants of fertility and most recently Easterlin has extended it to consider variations in health and mortality, with particular reference to the members of the post-World War II baby boom generation. For example, to take the case of suicide, "If generation size affects the relative income of young adults, their suicide rate would presumably reflect variations in stress associated with generation size. In fact, this is so ... From World War II through the mid-1950s, when the relative number of young adults was declining, the suicide rate was virtually constant. Thereafter, as the relative number of young adults rose, the suicide rate increased until, by the late seventies, it was about three times that of the fifties" (Easterlin: 1980: 104).

More generally, Easterlin predicts, "As generation size declines and as the relative income of young adults improves, so too does their mental outlook. They are more likely to marry and to have children, and mental stress, as evidenced by crime and suicide will decline. As generation size grows and as relative income deteriorates, the opposite will happen" (Easterlin: 1980: 106).

Leaving aside the issue of which relational context is the appropriate one (i.e., parents or peers), it may be that a time-series indicator of income inequality could clarify the inverse association observed between unemployment and mortality.

(9) See also Danziger and Wheeler (1975) for a discussion of relative incomes.

(10) One method of the calculation of the Gini (G) coefficient is as follows:

$$G = \frac{1}{N^2 M} \sum_{r}^{n} \sum_{s}^{n} \left| Y_r - Y_s \right| f_r \cdot f_s$$

N = the total number of income recipients
M = the mean income of all recipients
Y_r Y_s = a pair of income class means
f_r f_s = the frequencies of these income classes

Source: (Health and Welfare Canada: 1977: p. 12).

Unfortunately there are no Canadian time-series data for the period under consideration in this study (1950-1977) that would be representative of Canadian income earners.

For the United States however, Paglin (1975) has reproduced a series of Gini Coefficients for the period 1947-1972. For exploratory purposes, correlations between this series and selected U.S. mortality rates, and comparative results for the unemployment rate are shown in Appendix F. After detrending this series, it was then correlated with the residuals of the age-standardized death rates for cirrhosis of the liver, homicide and suicide. The only significant association was observed between the synchronous value of the Gini Coefficient and the suicide rate (see Appendix F).

However, there are two significant problems associated with this particular measure of income inequality. Firstly, the Gini reported in Paglin computes inequality for all income. Most probably employment income is the most salient income component for the relative income concept. It would seem most likely that other components of income, transfer payments for example, would tend to reduce variation inemployment income inequality.(11)

Secondly, the Gini Coefficients shown in Paglin are based on both families and unattached individuals. For the purposes of measuring relative income it would be preferable to compute Gini based on a sample of individuals.(12) At present however, this must remain a task for future research.

(11) This point has been demonstrated by Henderson and Rowley in an examination of the distribution of income in Canada from 1967-1975. "Prior to 1973 changes in the distribution of other income and changes in the distribution of employment income have, as might reasonably have been expected, reinforced each other. Their negative association with transfers is also consistent with the provision of supplemental benefits during moderate cyclical downturns" (Henderson and Rowley: 1980: 361).

(12) In a study of the income distribution Canada in the post-war period, MacLeod and Horner (1980) have reported that two-income families have an effect of reducing income inequality. Having observed that "It has been suggested that working wives come from higher income husband-wife families and thus increase the income spread among such families", their findings indicate that this was not the case. "The increase in the number of working wives has significantly reduced income inequality among husband-wife families" (MacLeod and Horner: 1980: 10).

Heart Disease

One final consideration that should be mentioned is the positive association observed between both, the unemployment rate and average duration, and heart disease mortality.

In view of the majority of inverse associations observed for other causes of death, why does heart disease stand out as an exception? One possible explanation for this finding is suggested by the tendency of the significant associations between heart disease and unemployment to occur among older age groups (with the exception of males 35-44).

To some extent, positive associations observed for other causes of death were also found in the older age groups (primarily in the 70+ age groups). One question suggested by this pattern is; Is the unemployment/labour force behaviour of older age groups countercyclical to that of the total labour force? This possibility was explored by correlating the unemployment rate, disaggregated by age for the period 1956-1980 (the longest series available) with the total unemployment rate. These results indicate that this is true for the 65+ age group (Text Table VI).

For age groups up to 64 the age-disaggregated rates are essentially co-linear with the total unemployment rate, while that for the 65+ age group is negatively correlated.

Taking a different approach, there is further evidence that these older workers tend to withdraw from the labour force in times of increasing unemployment (see footnote 8 in Chapter 3 for Brenner's observation on forced retirement).

In a time series analysis of the labour force participation rates of the same age-groups reported in Text Table VI, Swidinsky found that, "Ignoring the problem of severe auto-correlation the most striking feature of these results is the presence of both added and discouraged-worker effects. The added-worker effect dominates for males 20-24 and 25-44 years whereas the discouraged-worker effect dominates for males 14-19 and 65+ years" (Swidinsky: 1973: 60). Thus when aggregate unemployment increases, the labour force participation of the older worker decreases. Clearly these are two possibilities that could contribute to the same result, a counter-cyclical unemployment rate and a pro-cyclical labour force participation rate. (It should be noted, however, that this was not observed for the United States, and also that the income-change correlations reported for Canada did not indicate any counter-cyclical trends for the older age groups either (see Apendices E and G)).

TEXT TABLE VI. Correlations: Total Unemployment Rate with Unemployment Rates by Age Group: Canada, 1956-1980

	14-19(1)	20-24	25-44	45-64	65+
Total Unemployment Rate	.93221	.98124	.97856	.82785	- .42530

(1) 15-19 after 1965.

Summary and Recommendations

The regression analysis of Canadian mortality rates, disaggregated by sex, age, and cause of death, on the unemployment rate for the period 1950-1977, has shown a predominantly negative relationship. Further time-series analysis of the components of the unemployment rate suggest that the rate is most heavily determined by the duration component, which would correspond most closely with the economic hardship presumed(13) to accompany unemployment.

Indeed, when the mortality series for Canada are regressed on the average duration variable the same negative relationship is observed. It is concluded on the basis of these results that the negative relationship is not an artefact of method or measurement.(14) The explanation that unemployment is stress reducing is rejected, since heart disease does show a positive association with the unemployment rate. To return to the recent literature it was then seen that some researchers have attempted to study the unintended consequences of economic growth. The per capita income variable, however, was rejected because it is a measure of aggregate progress and cannot account for the majority of inverse relationships observed in the Canadian case. A measure of changes in the distribution of income, however, is a more compelling indicator of relative progress as discussed by Brenner and others, unfortunately, no lengthy time-series data on the distribution of income are available for Canada.

Questions for Further Research

When these results are taken into consideration with those reported elsewhere (as discussed in the literature review) it is evident that some substantative and methodological questions remain for further research. Given that detrended American data from the post World War II period also tend to show an inverse association with the unemployment rate, we must ask if (and why) there has been a significant discontinuity in this relationship in the post-war period. It seems clear that many positive time-series correlations between economic recession and mortality owe directly to the Great Depression. If we accept that causes of death such as suicide did rise dramatically during the Depression, why does the relationship appear to be different now? Probably the most urgent line of further inquiry in this regard is the development of more disaggregated indicators of economic growth, with emphasis on a relational context.

Concerning the **methodological aspects** of the analysis, five recommendations appear obvious. These apply especially to time-series analytic studies that attempt to either corroborate or discount each other.

Comparable time periods should be employed.

Comparable mortality indicators should be used. Cause-of-death is the important consideration here, and a secondary consideration would be the choice of age-sex groups.

More consideration should be given to the equivalence of various time-series analytical techniques. At present all types are observed in the literature, for example, spectral analysis, Cochrane-Orcutt regression and the Box-Jenkins ARIMA models, and those which apply Ordinary Least Squares regression to both detrended and undetrended mortality and economic activity data.

Numerous meanings have been imputed to the unemployment rate as a measure of stress. Since many researchers claim that the unemployment/mortality studies have important policy recommendations the same would be well advised to incorporate more explicit measures of these imputed meanings, such as, income loss, stress of being dislocated from long-tenured employment, etc.

It would be advisable to employ disease incidence rates, if available, since it has been argued that the use of mortality rates does not take account of the lag between disease onset and mortality. Such data are seldom available, however.

(13) The assumption characterizes virtually all the literature.

(14) This conclusion is reinforced in that the negative relationship has been reported elsewhere for Canadian data, in studies that have employed different methods of time-series analysis. (See MacLeod (1978) and Dear et al (1979).)

TABLE 1. Regression Results: Mortality and Psychiatric Morbidity on the Unemployment Rate (U)(1)

Dependent variable	Intercept	U_t	U_{t-1}	U_{t-2}	U_{t-3}	U_{t-4}	U_{t-5}	R^2	D.W.
Lung cancer									
Male:									
Total	- 0.402567						- 0.619380	.2761	.5111
							(0.218879)	8.01	
35-44 years	- 0.038840	- 0.728229			0.314219		- 0.567858	.7751	1.5276
		(0.096286)			(0.105260)		(0.105095)	21.83	
65-69 "	0.134937	- 3.961572		- 3.992664				.4958	2.3285
		(1.657512)		(1.685580)				9.83	
70 years and over	- 4.337639					- 6.513725		.2693	.6512
						(2.341250)		7.74	
Female:									
25-34 years	- 0.000973					0.067295		.2249	2.1858
						(0.027258)		6.09	
Other malignant neoplasms									
Male:									
Total	- 0.438016					- 1.047768		.4057	1.1011
						(0.276753)		14.33	
45-54 years	- 0.692727		- 1.955942					.3168	1.6271
			(0.626836)					9.74	
65-69 "	- 0.449			- 7.053353				.2681	1.4774
				(2.542828)				7.69	
Female:									
Total	- 0.716093				- 1.010447			.2708	.7289
					(0.361852)			7.80	
55-64 years	- 0.293013						- 2.719087	.1985	1.7200
							(1.192227)	5.20	
Respiratory disease									
Male:									
Total	- 0.408764					- 1.494495		.2088	1.8944
						(0.634898)		5.54	
0-14 years	- 1.117493						- 2.116155	.2928	.5678
							(0.717633)	8.70	
35-44 "	- 0.058564					- 0.548178		.2664	1.8509
						(0.198483)		7.63	
45-54 "	- 0.377429					- 1.367865		.2379	1.9711
						(0.534272)		6.55	
65-69 "	0.907150					- 7.955207		.1966	1.2984
						(3.509045)		5.14	
Female:									
Total	- 0.609794					- 1.214947		.2002	1.5248
						(0.529905)		5.26	
0-14 years	- 1.143056						- 1.888010	.3011	.3922
							(0.627619)	9.05	
15-24 "	- 0.038978					- 0.313485		.1770	2.2210
						(0.147492)		4.52	
35-44 "	- 0.146400				- 0.432397			.2312	2.8503
					(0.172048)			6.32	
45-54 "	- 0.221730					- 0.912399		.2604	2.4052
						(0.335508)		7.40	
55-64 "	- 0.493392					- 2.209540		.3207	2.2449
						(0.701683)		9.92	
65-69 "	- 1.433168					- 4.226709		.3311	1.9368
						(1.310984)		10.39	

See footnote(s) at end of table.

TABLE 1. Regression Results: Mortality and Psychiatric Morbidity on the Unemployment Rate (U)(1) - Continued

Dependent variable	Intercept	U_t	U_{t-1}	U_{t-2}	U_{t-3}	U_{t-4}	U_{t-5}	R^2	D.W.
Digestive disease									
Male:									
Total	0.054768	- 0.227540 (0.069437)			0.160574 (0.070045)			.4000 6.67	1.3228
0-14 years	- 0.039808					- 0.076038 (0.026558)		.2808 8.20	.6517
65-69 "	0.526435	- 1.794362 (0.755190)						.2119 5.65	.6717
70 years and over	1.868186						3.786153 (1.362505)	.2688 7.72	.5320
Female:									
15-24 years	0.003003						0.057404 (0.014857)	.4155 14.93	2.1189
55-64 "	- 0.037531		0.236949 (0.111282)					.1776 4.53	1.8632
65-69 "	0.239093	- 1.199930 (0.339288)		0.886094 (0.345033)				.4100 6.95	2.1335
Cirrhosis of the liver									
Male:									
Total	- 0.263960						- 0.627602 (0.220317)	.2787 8.11	.3710
35-44 years	- 0.346847						- 0.756860 (0.219466)	.3616 11.89	.9430
45-54 "	- 0.932136						- 1.987121 (0.695854)	.2797 8.15	.4566
55-64 "	- 0.730168						- 2.227026 (0.788808)	.2751 7.97	.6436
65-69 "	- 0.570539						- 2.155303 (1.024907)	.1740 4.42	.8398
70 years and over	- 0.206908	1.791391 (0.538110)						.3454 11.08	2.2550
Female:									
Total	- 0.109108						- 0.177457 (0.062158)	.2796 8.15	.7802
15-24 years	0.004976		0.046044 (0.020521)					.1934 5.03	1.8575
35-44 "	- 0.036689		- 0.180605 (0.083410)				- 0.204704 (0.081242)	.3533 5.46	2.2553
45-54 "	- 0.153923						- 0.545855 (0.242226)	.1947 5.08	1.1471
55-64 "	- 0.426593					- 0.631144 (0.265493)		.2120 5.65	1.6146
Genito-urinary disease									
Male:									
15-24 years	0.018270		0.186852 (0.089556)					.1717 4.35	1.9650
25-34 "	- 0.055960						- 0.146393 (0.061675)	.2115 5.63	.9486
65-69 "	- 2.686734			- 3.587833 (1.227831)				.2891 8.54	1.0563
Female:									
15-24 years	0.045210			0.198728 (0.066448)				.2987 8.94	2.7994
65-69 "	- 2.227440				- 2.216474 (1.021633)			.1831 4.71	.6115

See footnote(s) at end of table.

TABLE 1. Regression Results: Mortality and Psychiatric Morbidity on the Unemployment Rate (U)(1) - Continued

Dependent variable	Intercept	U_t	U_{t-1}	U_{t-2}	U_{t-3}	U_{t-4}	U_{t-5}	R^2	D.W.
Suicide									
Male:									
Total	- 0.319982						- 0.679508 (0.160758)	.4597 17.87	.6417
15-24 years	- 0.732087						- 1.073950 (0.402205)	.2535 7.13	.8450
25-34 "	- 0.273685					- 0.632243 (0.207495)		.3066 9.28	1.8010
35-44 "	- 0.426300					- 1.002452 (0.232251)		.4701 18.63	1.1983
45-54 "	- 0.155543						- 0.789256 (0.215888)	.3889 13.37	1.8390
70 years and over	- 0.275311					- 1.063262 (0.369143)		.2832 8.30	2.8178
Female:									
Total	- 0.180270	- 0.205678 (0.074039)				- 0.358545 (0.073739)		.6041 15.26	.6705
15-24 years	- 0.231975					- 0.249272 (0.110209)		.1959 5.12	.7458
25-34 "	- 0.143888	- 0.344583 (0.125594)				- 0.411227 (0.125086)		.4705 8.88	1.8735
35-44 "	- 0.263789			- 0.924276 (0.160095)				.6135 33.33	1.6889
45-54 "	- 0.218166	- 0.578154 (0.169161)				- 0.765185 (0.168475)		.6104 15.67	1.5350
55-64 "	- 0.205630	- 0.591182 (0.228934)			- 0.643560 (0.230938)			.4805 9.25	2.2577
70 years and over	- 0.122421					- 0.398773 (0.126753)		.3203 9.90	2.2097
Non-traffic accidents									
Male:									
Total	- 0.487940					- 0.953298 (0.309840)		.3107 9.47	.7494
15-24 years	- 0.568855					- 1.960555 (0.541423)		.3844 13.11	.8673
35-44 "	- 0.165915		- 1.322723 (0.359960)					.3914 13.50	1.1693
45-54 "	- 0.699229					- 2.036878 (0.459421)		.4835 19.66	.9309
65-69 "	- 0.243660		- 2.702272 (0.171253)					.2022 5.32	1.8030
70 years and over	- 1.273290			- 4.256829 (1.306487)				.3358 10.62	1.7933
Female:									
Total	- 0.078499						- 0.351891 (0.127278)	.2669 7.64	1.8286
15-24 years	- 0.105766					- 0.366175 (0.140338)		.2448 6.81	1.5913
35-44 "	- 0.220719					- 0.316412 (0.146046)		.1827 4.69	1.9944
45-54 "	- 0.007149				- 0.588462 (0.229632)			.2382 6.57	2.0009
55-64 "	0.609403		- 0.960846 (0.329388)					.2884 8.51	1.6696
70 years and over	- 1.825336						- 3.201096 (1.377676)	.2045 5.40	1.3830

See footnote(s) at end of table.

TABLE 1. Regression Results: Mortality and Psychiatric Morbidity on the Unemployment Rate (U)(1) - Continued

Dependent variable	Intercept	U_t	U_{t-1}	U_{t-2}	U_{t-3}	U_{t-4}	U_{t-5}	R^2	D.W.
Traffic accidents									
Male:									
Total	0.363031	- 1.668345 (0.405413)						.4464 16.93	.6818
0-14 years	0.034756	- 0.621826 (0.164095)						.4061 14.36	.8354
15-24 "	0.697211	- 3.573659 (0.995393)						.3803 12.89	.7418
25-34 "	1.067513	- 2.078695 (0.637194)						.3363 10.64	.5858
35-44 "	0.603319					1.538127 (0.590777)		.2440 6.78	.5538
45-54 "	0.914406	- 1.895883 (0.514077)			1.105555 (0.518577)			.4355 7.72	.4613
55-64 "	0.963910	- 2.519440 (0.583817)			1.560239 (0.588927)			.5199 10.83	1.0662
65-69 "	0.868429	- 2.813117 (0.953027)						.2932 8.71	1.7989
70 years and over	1.163655	- 1.984248 (0.836657)						.2113 5.62	1.0208
Female:									
Total	0.131103	- 0.772737 (0.167051)						.5047 21.40	.7354
0-14 years	0.050663	- 0.565428 (0.136658)						.4491 17.12	1.2862
15-24 "	0.131363	- 1.333245 (0.338793)						.4244 15.49	.8537
25-34 "	0.195578	- 0.707112 (0.198220)						.3773 12.73	.7718
45-54 "	0.177440	- 0.702292 (0.309658)						.1967 5.14	1.3745
55-64 "	0.450337	- 0.923693 (0.291546)				0.631301 (0.290365)		.4232 7.61	1.2619
65-69 "	0.710196	- 1.121998 (0.535438)						.1729 4.39	1.4710
70 years and over	0.329878	- 1.616769 (0.390091)		0.966934 (0.396697)				.4701 8.87	1.7366
Homicide									
Male:									
Total	- 0.072512						- 0.154512 (0.040710)	.4069 14.41	1.0841
15-24 years	- 0.103865						- 0.267399 (0.081271)	.3401 10.83	1.1777
25-34 "	- 0.093255						- 0.192446 (0.074733)	.2400 6.63	2.2211
35-44 "	- 0.102686						- 0.225918 (0.077698)	.2870 8.45	1.4406
45-54 "	- 0.140150						- 0.246706 (0.085174)	.2855 8.39	1.0437
Female:									
Total	- 0.028035						- 0.077790 (0.019727)	.4254 15.55	2.1483
25-34 years	- 0.027790						- 0.108910 (0.051511)	.1755 4.47	2.5112
45-54 "	- 0.020686						- 0.132313 (0.047208)	.2722 7.86	1.8619

See footnote(s) at end of table.

TABLE 1. Regression Results: Mortality and Psychiatric Morbidity on the Unemployment Rate (U)(1) - Continued

Dependent variable	Intercept	U_t	U_{t-1}	U_{t-2}	U_{t-3}	U_{t-4}	U_{t-5}	R^2	D.W.
Heart disease									
Male:									
Total	1.399334						3.288930 (0.816230)	.4360 16.24	1.2377
35-44 years	0.789901					1.874324 (0.583882)		.3292 10.30	1.0947
45-54 "	3.234688					8.555937 (2.313734)		.3944 13.67	.6398
55-64 "	7.653102						12.511656 (4.14916)	.3022 9.09	.9625
70 years and over	28.966649						48.186396 19.996481	.2166 5.81	.5216
Female:									
35-44 years	- 1.029912				- 0.972154 (0.384015)			.2338 6.41	.4550
55-64 "	0.539818		- 4.207867 (1.617495)	5.963051 (1.601423)				.4094 6.93	1.4377
65-69 "	4.129475				11.122709 (2.837639)			.4225 15.36	1.7743
70 years and over	17.383389					35.660062 (10.351340)		.3611 11.87	1.0218
Diseases of the arteries									
Male:									
Total	- 0.364887	- 0.663515 (0.162885)				- 0.290626 (0.225377)	- 0.691155 (0.233524)	.6998 14.76	.8825
45-54 years	- 0.155646						- 0.455602 (0.190739)	.2136 5.71	1.7015
55-64 "	- 0.315035		- 2.450249 (0.570720)	1.357529 (0.583823)			- 1.464838 (0.411480)	.5957 9.33	2.1488
65-69 "	- 0.614678	- 3.006856 (0.761660)				- 2.318494 (0.758575)		.5472 12.08	1.6107
70 years and over	- 5.631469	- 12.689962 (2.601993)				- 4.067520 (3.600274)	-11.968229 (3.730410)	.7306 17.17	1.0038
Female:									
Total	- 0.402050	- 0.530337 (0.180889)					- 0.813553 (0.180967)	.5427 11.87	.9167
15-24 years	- 0.001987			0.069483 (0.018757)				.3952 13.72	2.3001
25-34 "	0.021709					0.109275 (0.041019)		.2526 7.10	1.9843
55-64 "	- 0.445516					- 0.701642 (0.230850)		.3055 9.24	1.1633
70 years and over	- 4.520256	- 8.868047 (2.189935)					-10.689572 (2.190881)	.6184 16.21	1.2111
Disease of the veins									
Male:									
15-24 years	- 0.012393			0.034311 (0.015638)				.1865 4.81	1.6686
35-44 "	- 0.00686						- 0.121796 (0.054308)	.1932 5.03	2.3618
55-64 "	- 0.090939			- 0.419583 (0.181266)				.2033 5.36	1.9138
70 years and over	0.374433					1.606197 (0.535803)		.2997 8.99	1.9216

See footnote(s) at end of table.

TABLE 1. Regression Results: Mortality and Psychiatric Morbidity on the Unemployment Rate (U)(1) - Concluded

Dependent variable	Intercept	U_t	U_{t-1}	U_{t-2}	U_{t-3}	U_{t-4}	U_{t-5}	R^2	D.W.
Disease of the veins - Concluded									
Female: 35-44	- 0.017019		- 0.257043 (0.048085)	0.105282 (0.047607)				.6231 16.53	1.8925
45-54 "	- 0.021440	- 0.295937 (0.083969)						.3717 12.42	.9092
70 years and over	- 0.130808			1.219562 (0.410727)				.2957 8.82	1.7001
Other causes									
Female: 35-44 years	- 2.559090				- 2.567032 (0.956161)			.2555 7.21	.3436
70 years and over	3.183925		12.871161 (5.502785)					.2067 5.47	1.3518
All causes									
Male: 15-24 years	- 2.831370					- 4.299047 (1.802192)		.2132 5.69	.7736
25-34 "	- 0.834702		- 2.113666 (0.857472)					.2244 6.08	1.2300
35-44 "	- 2.086882		- 4.245408 (1.318922)				- 2.784417 (1.284628)	.4272 7.46	.8540
45-54 "	- 2.386388		- 6.250532 (1.529919)					.4428 16.69	1.4133
65-69 "	18.077828		-34.490117 (13.850081)					.2280 6.20	.7838
70 years and over	29.131367	- 61.811926 (24.736759)						.2292 6.24	.8998
Female: 25-34 years	- 2.119480			- 2.582787 (0.889713)				.2864 8.43	.6748
35-44 "	- 4.705884				- 5.721826 (1.611752)			.3751 12.60	.3450
45-54 "	- 5.588416		- 5.873823 (2.483721)					.2103 5.59	.6352
First admissions									
Psychotic: Male	0.856927		1.639822 (0.441491)					.3965 13.80	1.1719
Female	1.358695		1.615781 (0.639146)					.2333 6.39	.9059
Neuroses: Female	0.761737	- 2.083632 (0.820365)						.2350 6.45	1.2488
Alcoholism: Male	- 0.111916	- 5.243107 (1.121622)						.5099 21.85	1.8072
Male: Total	0.473871	- 5.664085 (1.855100)					- 3.924438 (1.855901)	.3608 5.65	1.4643

(1) Standard error of B appears in brackets below the regression coefficient. F ratio appears below the R^2 coefficient.

TABLE 2. Regression Results: Mortality and Psychiatric Morbidity on the Average Annual Duration of Unemployment (A)(1)

Dependent variable	Intercept	A_t	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	A_{t-5}	R^2	D.W.
Lung cancer									
Male:									
Total	- 0.348858					- 1.659606 (0.779885)		.1774 4.53	.3828
65-69 years	0.992068			- 19.661929 (7.920028)				.2269 6.16	1.5161
70 years and over	- 3.606090					- 17.698475 (8.346119)		.1764 4.50	.5237
Female:									
25-34 years	- 0.009127					0.226638 (0.091443)		.2263 6.14	2.1539
35-44 "	- 0.023840		- 0.708644 (0.337097)					.1739 4.42	1.8857
Other malignant neoplasms									
Male:									
Total	- 0.307404					- 3.795975 (0.875596)		.4723 18.79	.9665
45-54 years	- 0.242396		- 7.938826 (2.539842)			- 4.723724 (1.955266)		.4115 6.99	1.9070
65-69 "	- 0.239723					- 20.189654 (8.724933)		.2032 5.35	1.1925
70 years and over	3.564824					- 29.559639 (12.496475)		.2104 5.60	1.0741
Female:									
55-64 years	0.059286						- 8.394060 (4.030519)	.1712 4.34	1.8010
Respiratory disease									
Male:									
15-24 years	0.026124						- 1.022389 (0.452349)	.1957 5.11	2.7083
Female:									
15-24 years	0.013507						- 1.123542 (0.484424)	.2039 5.38	2.5093
Digestive disease									
Male:									
0-14 years	- 0.015430	- 0.294996 (0.103234)				- 0.282505 (0.078531)		.4802 9.24	.8420
25-34 "	- 0.000701			- 0.370908 (0.171204)				.1827 4.69	2.2793
Female:									
Total	- 0.015083					0.348787 (0.104046)		.3486 11.24	1.8124
15-24 years	- 0.001881					0.146971 (0.056486)		.2438 6.77	1.9556
25-34 "	0.015612	- 0.237210 (0.110639)						.1796 4.60	2.7081
55-64 "	- 0.072179	1.067860 (0.470630)						.1969 5.15	1.9210
65-69 "	0.092412	- 6.283191 (1.722676)	4.699286 (1.702260)					.4068 6.86	2.1016
70 years and over	0.290193					6.583005 (2.138293)		.3110 9.48	1.1319
Cirrhosis of the liver									
Male:									
15-24 years	- 0.009273						0.111782 (0.050273)	.1906 4.94	2.1659
35-44 "	- 0.264190						- 1.737389 (0.830697)	.1724 4.37	.6222
Female:									
35-44 years	- 0.020809						- 0.779417 (0.280161)	.2693 7.74	1.8620

See footnote(s) at end of table.

TABLE 2. Regression Results: Mortality and Psychiatric Morbidity on the Average Annual Duration of Unemployment (A)(1) - Continued

Dependent variable	Intercept	A_t	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	A_{t-5}	R^2	D.W.
Genito-urinary disease									
Male:									
0-14 years	- 0.032421	- 0.411149 (0.178102)						.2024 5.33	1.5022
15-24 "	- 0.007130	0.803780 (0.382869)						.1735 4.41	1.6350
25-34 "	- 0.035415						- 0.513260 (0.201925)	.2353 6.46	.9694
65-69 "	- 1.572856		-16.798829 (5.025180)					.3473 11.18	1.1088
Female:									
Total	- 0.363571	- 2.213028 (0.943130)						.2077 5.51	.2640
15-24 years	0.008995	- 0.958305 (0.340713)	1.261441 (0.336675)					.4192 7.22	1.9227
25-34 "	- 0.014807	- 0.603740 (0.278076)						.1833 4.71	2.5337
65-69 "	- 1.444398	-13.092565 (4.012550)						.3364 10.65	.5973
70 years and over	- 4.035620	-22.844845 (10.706529)						.1782 4.55	.2650
Suicide									
Male:									
Total	- 0.263920					- 1.610869 (0.640964)		.2312 6.32	.4167
25-34 years	- 0.153447				- 1.830789 (0.850563)			.1807 4.63	1.5251
35-44 "	- 0.317422					- 2.451877 (0.928071)		.2495 6.98	.8393
45-54 "	- 0.065450						- 1.963357 (0.812022)	.2178 5.85	1.8080
55-64 "	0.413517						- 3.084283 (1.336751)	.2022 5.32	1.7701
70 years and over	- 0.148213					- 3.452577 (1.255192)		.2649 7.57	2.4825
Female:									
Total	- 0.072018	- 0.991543 (0.361747)			- 0.984153 (0.306174)		- 0.701719 (0.273678)	.5438 7.55	.7551
25-34 years	- 0.062320	- 1.491149 (0.590836)				- 1.368609 (0.449457)		.4061 6.84	1.4704
35-44 "	- 0.049796			- 3.155339 (0.865131)				.3878 13.30	.9612
45-54 "	- 0.041081		- 2.344304 (0.872357)			- 2.295308 (0.671573)		.4584 8.46	1.2580
55-64 "	- 0.012123	- 2.596854 (1.046226)			- 2.523584 (0.893930)			.4101 6.95	2.1460
70 years and over	- 0.03200				- 1.522239 (0.475248)			.3282 10.26	1.7219
Non-traffic accidents									
Male:									
15-24 years	- 0.350361					- 5.202755 (2.019721)		.2401 6.64	.8848
45-54 "	- 0.481343					- 4.736878 (1.881044)		.2319 6.34	1.0179
55-64 "	- 0.706957		- 5.084818 (2.403844)					.1756 4.47	1.5799
65-69 "	0.114746	-11.446313 (5.025643)						.1981 5.19	1.7390
70 years and over	- 0.322660			-14.037127 (6.164063)				.1980 5.19	1.4971

See footnote(s) at end of table.

TABLE 2. Regression Results: Mortality and Psychiatric Morbidity on the Average Annual Duration of Unemployment (A)(1) - Continued

Dependent variable	Intercept	A_t	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	A_{t-5}	R^2	D.W.
Non-traffic accidents - Concluded									
Female:									
Total	0.031535	- 1.043028 (0.464141)					- 1.556952 (0.351162)	.5282 11.19	1.8729
55-64 years	0.321777	- 4.737029 (1.015367)					- 3.556938 (0.768212)	.6550 18.99	1.9110
70 years and over	- 1.370051						-11.458427 (4.485214)	.2371 6.53	1.0665
Traffic accidents									
Male:									
35-44 years	0.228368				6.531307 (2.129533)			.3094 9.41	.5444
Female:									
45-54 years	0.058640					2.305372 (1.040111)		.1896 4.91	1.0138
Homicide:									
Male:									
55-64 years	- 0.006422					- 0.755648 (0.359146)		.1741 4.43	1.8422
Female:									
Total	- 0.018896						- 0.207076 (0.073782)	.2728 7.88	1.7906
45-54 years	- 0.000508						- 0.526470 (0.143684)	.3900 13.43	1.8555
65-69 "	- 0.061945						0.620295 (0.251267)	.2249 6.09	2.4530
Heart disease									
Male:									
Total	1.121054					8.305193 (3.148694)		.2489 6.96	.8508
35-44 years	0.567403					5.972529 (2.007675)		.2965 8.85	.9860
45-54 "	2.235608					26.047288 (8.206314)		.3242 10.07	.6451
Female:									
Total	- 0.509014					3.585441 (1.442956)		.2272 6.17	1.8553
35-44 years	- 0.671622		- 4.436081 (1.622299)					.2626 7.48	.5676
45-54 "	- 0.935025		- 7.825619 (3.379199)					.2034 5.36	.6373
55-64 "	0.135579					9.073666 (4.362392)		.1708 4.33	1.8542
65-69 "	2.372663			28.331239 (12.453379)				.1977 5.18	1.6594
70 years and over	6.293409		102.140051 (45.825766)			104.843122 (35.278395)		.3823 6.19	.8317
Diseases of the arteries									
Male:									
Total	- 0.227827	- 2.220284 (0.976518)					- 2.007941 (0.738820)	.3562 5.53	.7022
45-54 years	- 0.113404					- 1.421356 (0.648629)		.1861 4.80	1.7928
55-64 "	- 0.319681						- 4.082559 (1.687406)	.2180 5.85	1.2899
Female:									
Total	- 0.386052						- 1.600262 (0.765393)	.1723 4.37	.3478
15-24 years	- 0.019776			0.261335 (0.086447)				.3032 9.14	1.9112

See footnote(s) at end of table.

TABLE 2. Regression Results: Mortality and Psychiatric Morbidity on the Average Annual Duration of Unemployment (A)(1) - Concluded

Dependent variable	Intercept	A_t	A_{t-1}	A_{t-2}	A_{t-3}	A_{t-4}	A_{t-5}	R^2	D.W.
Diseases of the arteries - Concluded									
25-34 years	- 0.000071				0.341573 (0.162671)			.1735 4.41	2.0398
55-64 "	- 0.177935		- 2.383951 (0.998749)				- 2.019785 (0.764702)	.3599 5.62	1.2370
Disease of the veins									
Male:									
35-44 years	0.012241						- 0.505151 (0.168084)	.3007 9.03	2.4491
55-64 "	0.075252		- 2.490536 (0.676086)					.3925 13.57	2.3850
Female:									
Total	- 0.036544	- 0.582322 (0.208377)						.2711 7.81	.9092
35-44 years	- 0.005391	- 0.621493 (0.191129)						.3349 10.57	1.3493
45-54 "	0.041976	- 1.507811 (0.299275)			- 0.619138 (0.255710)			.6067 15.43	1.5015
70 years and over	- 0.28879				4.268585 (1.549137)			.2655 7.59	1.8304
Other causes									
Male:									
55-64 years	- 2.806055					11.819424 (5.476044)		.1816 4.66	.2880
Female:									
70 years and over	0.561079		53.459984 (23.378616)					.1994 5.23	1.2668
All causes									
Male:									
25-34 years	- 0.229803	-11.727563 (2.918207)					- 7.20765 (2.207874)	.5418 11.82	1.6384
45-54 "	- 1.490742		- 27.043306 (5.983455)		11.389411 (5.173852)			.5477 12.11	1.4232
55-64 "	2.089578				48.846234 (15.587469)			.3186 9.82	1.3862
Female:									
25-34 years	- 1.492546			- 9.227618 (4.049216)				.1983 5.19	.5509
35-44 "	- 3.060403			- 18.708926 (7.824138)				.2140 5.72	.4717
45-54 "	- 4.405750	-32.923623 (9.563807)						.3607 11.85	.4527
55-64 "	- 1.503187	- 47.857953 (12.938835)					- 26.200536 (9.789336)	.4801 9.23	.7931
First admissions									
Psychotic:									
Male	0.701721	5.704740 (2.089443)						.2620 7.45	.9533
Female	1.125827	7.214118 (2.698374)						.2539 7.15	.8734
Alcoholism:									
Male	- 0.032217	- 14.586979 (6.282845)						.2043 5.39	1.2134

(1) Standard error of B appears in brackets below the regression coefficient. F ratio appears below the R^2 coefficient.

APPENDIX A

AVERAGE ANNUAL UNEMPLOYMENT RATE AND AVERAGE ANNUAL DURATION OF UNEMPLOYMENT: CANADA, 1950-1977

	Unemployment rate(1)	Average duration of unemployment (months)
1950	3.6	2.55
1951	2.4	1.54
1952	2.9	1.64
1953	3.0	2.36
1954	4.6	2.82
1955	4.4	2.85
1956	3.4	2.44
1957	4.6	2.39
1958	7.0	3.16
1959	6.0	3.08
1960	7.0	3.03
1961	7.1	3.41
1962	5.9	3.21
1963	5.5	3.10
1964	4.7	2.92
1965	3.9	2.77
1966	3.4	2.58
1967	3.8	2.61
1968	4.5	2.88
1969	4.4	3.04
1970	5.7	3.19
1971	6.2	3.56
1972	6.2	3.40
1973	5.5	3.21
1974	5.3	3.08
1975	6.9	3.29
1976	7.1	3.24
1977	8.1	3.34

AVERAGE ANNUAL UNEMPLOYMENT RATES(1) BY AGE AND SEX: CANADA, 1956-1977

	Male				Female		
	20-24	25-44	45-64	65+	20-24	25-44	45-64
1956	5.7	3.2	3.3	3.4	1.9	1.5	...
1957	8.2	4.5	4.3	4.3	2.7	1.9	1.3
1958	12.7	6.9	6.8	5.0	4.1	2.6	2.4
1959	10.5	5.8	5.8	5.2	3.7	2.2	1.6
1960	12.2	6.9	6.9	4.7	3.9	2.5	2.0
1961	11.8	7.3	7.3	5.8	4.2	2.6	2.3
1962	10.0	5.6	6.1	4.8	3.7	2.4	1.9
1963	9.6	5.1	5.4	4.6	4.1	2.2	2.2
1964	7.9	4.1	4.5	4.5	3.3	2.0	2.1
1965	5.7	3.4	3.9	4.5	3.1	1.9	1.4
1966	5.2	2.9	3.6	4.5	2.6	1.9	1.5
1967	6.0	3.6	3.8	4.7	3.3	2.0	1.7
1968	7.5	4.3	4.3	4.8	4.2	2.2	2.0
1969	7.4	3.8	4.2	5.3	3.8	2.6	2.2
1970	10.4	5.0	5.0	4.2	5.1	3.1	2.7
1971	11.2	5.2	5.3	5.5	6.1	3.6	2.9
1972	11.5	5.1	4.9	4.1	6.6	4.1	3.2
1973	9.9	4.3	4.2	4.3	6.5	3.9	2.9
1974	9.3	4.1	4.0	4.5	6.6	3.8	2.5
1975	10.5	4.4	3.9	5.4	9.1	7.1	5.4
1976	11.1	4.6	3.7	2.3	9.8	7.6	5.2
1977	12.6	5.2	4.5	2.3	11.7	8.2	6.1

(1) Expressed as a percentage of the labour force.

Source: Unemployment Rate: 1950-1965 - (Statistics Canada: 1975b, 57), 1966-1977 - (Statistics Canada: 1980b, 122). Average Duration of Unemployment: 1950-1952 - (Dominion Bureau of Statistics: 1958, 106), 1953-1974 - (Statistics Canada: 1975c, pp. 210-214), 1975-1977 - Monthly Issues of The Labour Force (Statistics Canada Catalogue 71-001 Monthly) Unemployment Rates by Age and Sex: 1956-1977 - Unpublished data obtained from the Labour Force Survey Group, Statistics Canada.

APPENDIX B

DISEASE GROUPINGS ACCORDING TO THE 6TH, 7TH AND 8TH VERSIONS OF THE INTERNATIONAL CLASSIFICATION OF DISEASES(1)

	6th and 7th	8th
Lung cancer	162-163	162
Other malignant neoplasms	140-161, 164-205	140-161, 163-209
Respiratory disease	470-527	460-519
Digestive disease	540-545	531-537
Cirrhosis of the liver	581	571
Genito-urinary disease	590-637	580-629
Suicide	963, 970-979	950-959
Non-traffic accidents	800-802, 830-962	800-807, 820-949
Traffic accidents	810-825	810-819
Homicides	980-985	960-969
Heart disease	410-416, 420-422, 430-434, 440-443, 444-447	393-398, 400-404, 410-414, 420-429
Diseases of arteries	450-456	440-448
Diseases of veins	460-468	450-458
All other causes	All residual categories	All residual categories

(1) If death is due to an accident the external cause of death is used.

APPENDIX C

CANADIAN MORTALITY RATES, AND PSYCHIATRIC FIRST ADMISSION RATES, 1950-1977
LUNG CANCER

	TOTAL	0-14	15-24	25-34	35-44	45-54	55-64	65-69	70 +
	PER 100,000 POPULATION								
MALE									
1950	14.8	--	--	0.7	3.9	28.1	64.9	94.5	68.4
1951	15.4	--	--	0.5	4.8	23.5	67.5	102.1	80.7
1952	16.9	--	--	0.5	5.3	27.4	72.8	110.7	91.4
1953	18.4	--	--	0.9	5.5	29.2	78.5	118.6	106.1
1954	19.3	--	--	0.4	5.9	32.6	80.4	121.0	116.5
1955	20.3	--	--	0.5	4.6	29.9	93.1	130.7	125.2
1956	21.7	--	--	1.3	5.5	30.4	95.1	150.3	136.2
1957	21.9	--	--	1.1	5.5	31.4	106.2	145.1	131.8
1958	22.8	--	--	0.8	5.0	32.5	108.6	163.3	141.5
1959	23.4	--	--	0.2	5.0	36.1	103.9	159.3	158.4
1960	24.6	--	--	1.0	4.5	34.8	111.8	157.1	173.5
1961	26.1	--	--	0.7	6.5	35.8	109.8	188.6	184.6
1962	27.7	--	--	0.4	6.3	37.0	122.6	194.1	195.8
1963	29.6	--	--	0.9	6.0	38.8	130.8	195.7	218.6
1964	30.1	--	--	0.8	8.0	40.9	131.6	211.6	209.2
1965	31.1	--	--	0.9	7.6	41.5	130.3	234.7	220.6
1966	32.8	--	--	0.6	8.0	42.7	132.9	246.0	242.8
1967	36.2	--	--	0.8	8.5	46.8	142.5	262.3	282.4
1968	36.6	--	--	1.1	8.4	44.5	145.9	267.5	284.0
1969	38.3	--	--	1.2	9.8	47.7	151.5	277.9	288.4
1970	40.4	--	--	0.6	8.8	50.6	159.6	270.9	317.4
1971	42.6	--	--	0.8	9.7	48.1	159.8	293.5	345.5
1972	44.1	--	--	0.8	10.4	52.0	161.6	301.0	352.8
1973	46.2	--	--	0.5	10.7	59.0	172.4	276.5	371.7
1974	48.8	--	--	0.5	11.2	55.5	179.7	314.3	395.4
1975	48.5	--	--	0.9	9.5	51.0	176.9	303.9	404.3
1976	50.8	--	--	0.7	8.1	55.9	179.7	320.5	419.2
1977	53.0	--	--	0.8	8.7	56.6	183.6	319.9	445.0
FEMALE									
1950	2.9	--	--	0.4	1.1	4.6	9.9	14.8	22.9
1951	3.4	--	--	0.7	1.7	5.0	9.8	20.0	25.5
1952	3.7	--	--	0.4	1.9	4.2	12.2	21.5	28.9
1953	3.4	--	--	0.4	1.6	4.6	10.7	25.3	23.3
1954	3.5	--	--	0.1	1.6	6.4	8.1	16.5	32.7
1955	4.3	--	--	0.3	2.0	6.1	13.7	23.8	34.2
1956	3.7	--	--	0.2	1.4	4.9	12.0	21.2	29.1
1957	3.5	--	--	0.4	1.3	5.6	11.8	20.1	26.1
1958	3.4	--	--	0.2	1.4	6.0	10.8	20.3	25.2
1959	3.7	--	--	0.6	1.8	6.1	11.7	18.1	28.2
1960	3.6	--	--	0.2	1.8	4.7	13.4	19.8	26.7
1961	4.0	--	--	0.2	2.3	7.2	12.1	20.2	29.4
1962	4.7	--	--	0.5	2.2	7.5	14.9	26.1	33.7
1963	4.4	--	--	0.4	2.3	7.5	16.4	19.4	29.7
1964	4.8	--	--	0.6	2.3	8.7	15.3	23.9	33.1
1965	5.2	--	--	0.7	3.0	9.3	18.0	26.4	31.8
1966	5.5	--	--	0.7	3.2	10.8	17.4	28.2	33.0
1967	6.1	--	--	0.3	2.8	10.1	22.6	30.7	37.5
1968	6.5	--	--	0.3	4.1	9.1	20.9	29.4	45.5
1969	6.5	--	--	0.2	3.6	13.0	22.8	27.8	36.1
1970	7.1	--	--	0.4	4.5	11.5	23.7	34.5	39.8
1971	7.5	--	--	0.4	3.3	12.6	26.3	31.2	43.5
1972	9.0	--	--	0.5	2.5	15.2	32.2	42.4	49.7
1973	9.7	--	--	0.3	4.0	16.8	31.7	43.4	55.0
1974	10.5	--	--	0.8	4.2	16.5	39.7	40.4	56.4
1975	11.0	--	--	0.6	4.2	18.0	39.5	52.6	54.6
1976	11.5	--	--	0.2	4.2	18.4	39.9	48.1	60.7
1977	13.0	--	--	0.4	5.0	21.1	44.2	61.4	63.7

CANADIAN MORTALITY RATES, AND PSYCHIATRIC FIRST ADMISSION RATES, 1950-1977 - CONTINUED
OTHER MALIGNANT NEOPLASMS

	TOTAL	0-14	15-24	25-34	35-44	45-54	55-64	65-69	70 +
	PER 100,000 POPULATION								
MALE									
1950	115.9	8.4	7.6	14.0	34.6	103.3	319.5	615.2	1094.6
1951	115.1	8.1	10.0	14.6	31.1	110.9	313.6	573.0	1103.3
1952	118.3	8.9	9.0	16.4	34.5	120.7	318.2	581.4	1130.2
1953	116.9	10.2	8.9	14.8	34.5	113.9	293.2	571.6	1163.5
1954	116.8	8.7	9.8	16.7	35.6	115.4	303.0	611.6	1123.1
1955	118.0	8.2	8.7	16.5	34.2	110.2	314.7	582.8	1183.7
1956	117.5	9.6	9.0	15.8	31.6	113.5	307.7	597.2	1172.1
1957	115.4	9.4	10.0	16.2	33.6	106.8	313.9	583.7	1159.9
1958	113.9	8.7	7.8	14.8	33.8	107.4	305.0	582.1	1177.9
1959	110.9	8.4	8.0	14.1	33.2	96.2	306.0	569.9	1149.4
1960	114.6	8.6	10.3	16.6	33.9	104.9	291.7	567.6	1215.9
1961	116.9	8.6	10.3	15.7	33.5	102.8	312.8	599.1	1220.8
1962	115.7	8.9	9.0	14.6	37.0	99.9	308.5	580.1	1216.4
1963	114.0	8.5	9.0	17.0	32.6	104.3	305.1	561.3	1198.9
1964	114.8	8.6	9.2	14.5	36.7	101.0	310.3	597.7	1196.8
1965	113.1	8.5	10.0	14.3	34.1	103.4	289.5	569.7	1211.8
1966	116.3	7.6	10.4	14.7	33.0	109.8	313.0	584.2	1234.6
1967	115.6	8.6	11.7	14.7	34.2	105.3	307.5	597.3	1218.5
1968	115.9	7.8	9.1	16.0	35.2	104.3	300.1	618.8	1235.6
1969	118.3	8.9	8.5	13.4	34.2	111.4	300.7	597.5	1279.5
1970	119.6	8.2	9.0	14.2	35.6	103.8	302.7	628.2	1288.0
1971	118.7	7.2	9.2	12.7	36.2	106.2	303.2	605.5	1266.9
1972	120.2	8.5	8.4	13.2	34.6	105.4	303.5	591.7	1289.5
1973	121.0	7.0	8.5	11.9	36.8	107.3	307.0	590.4	1285.5
1974	119.0	6.5	9.3	13.1	34.4	108.6	296.0	577.6	1255.1
1975	120.1	6.0	9.1	13.6	33.0	112.7	293.8	568.8	1262.3
1976	119.8	6.2	8.5	12.5	35.2	105.4	294.8	571.6	1239.1
1977	121.3	6.7	7.9	14.0	30.7	107.3	300.4	566.7	1243.9
FEMALE									
1950	120.1	8.5	7.3	18.2	73.3	184.5	347.1	551.9	914.9
1951	119.2	7.0	5.5	19.6	72.7	184.2	352.8	519.7	910.1
1952	116.4	7.4	5.8	20.4	71.4	177.3	341.6	508.8	889.5
1953	118.8	6.8	6.6	19.0	69.7	175.0	347.9	517.6	932.6
1954	117.5	6.8	6.5	20.0	72.9	178.0	336.6	512.4	907.4
1955	115.2	7.5	6.3	19.4	66.2	167.9	334.9	508.8	903.1
1956	115.7	7.3	6.9	19.5	66.4	168.9	336.3	502.0	915.0
1957	115.7	7.3	6.5	18.8	65.9	168.8	347.8	526.0	897.9
1958	114.4	5.7	6.9	20.9	69.1	166.0	341.5	518.8	887.9
1959	115.6	7.3	6.8	19.4	63.1	170.0	334.0	515.2	909.1
1960	115.8	7.2	5.8	19.0	65.7	176.8	325.8	512.2	901.4
1961	111.4	6.5	6.9	15.5	61.3	163.6	317.7	486.7	874.6
1962	115.1	6.4	5.9	17.2	66.6	170.9	330.0	490.5	886.7
1963	116.3	7.3	7.9	19.2	62.6	169.0	323.4	501.0	900.1
1964	115.5	6.6	6.8	17.4	61.9	162.5	334.7	508.9	879.6
1965	115.3	6.8	5.8	14.9	62.5	167.1	313.0	492.2	894.9
1966	113.4	6.8	6.6	15.5	60.5	168.0	304.8	486.6	856.3
1967	117.1	6.4	7.0	15.6	65.5	162.7	322.3	484.3	877.5
1968	117.8	6.5	6.6	16.0	57.1	165.3	322.2	496.6	873.1
1969	119.3	5.8	5.2	14.8	60.4	160.6	322.3	484.0	889.9
1970	119.6	6.6	6.1	13.7	58.0	167.1	316.6	479.4	867.5
1971	119.4	6.3	5.5	16.0	57.6	150.0	313.2	472.1	875.7
1972	123.1	5.5	5.2	14.3	57.2	163.4	318.1	469.6	890.5
1973	123.4	5.5	5.8	14.1	54.5	153.3	321.4	450.5	898.8
1974	124.5	5.1	5.5	13.1	52.4	151.1	319.7	486.8	892.6
1975	120.7	5.3	4.2	13.4	50.1	144.5	297.6	464.3	868.3
1976	121.5	4.7	5.2	12.5	46.9	141.2	299.0	457.5	862.1
1977	122.8	4.9	5.6	11.6	50.3	142.1	303.7	461.8	840.9
RESPIRATORY DISEASE									
MALE									
1950	59.0	78.2	3.7	4.8	10.2	28.3	65.6	131.3	456.3
1951	69.8	76.7	5.5	5.2	9.9	29.5	75.3	157.8	644.0
1952	54.4	68.6	3.7	4.1	9.1	27.2	61.1	126.4	418.3
1953	59.6	67.3	5.0	6.1	10.5	26.6	72.7	129.0	499.1
1954	50.8	59.8	3.3	4.3	6.4	24.8	64.0	123.2	401.0
1955	54.6	57.1	3.6	5.0	8.2	22.5	69.3	142.6	471.8
1956	57.6	54.4	3.6	3.9	7.9	25.1	78.3	154.9	529.0
1957	66.7	56.1	7.5	4.9	11.7	33.7	104.3	206.2	599.3
1958	57.2	51.0	3.1	2.9	9.3	23.0	83.9	176.5	535.2
1959	63.9	44.3	3.6	4.8	11.6	29.4	94.9	198.1	664.7
1960	55.6	41.0	3.0	3.6	7.5	22.3	80.2	181.9	574.5
1961	52.2	34.7	2.9	3.6	7.2	22.2	77.6	179.0	551.6
1962	53.5	34.1	3.1	4.1	6.3	22.0	83.5	161.8	585.5
1963	63.0	32.6	3.5	4.1	7.6	26.8	96.4	201.4	744.2
1964	52.5	25.6	2.3	4.3	7.1	22.9	86.0	184.6	614.8
1965	53.6	23.9	2.7	2.8	8.0	27.5	91.3	193.6	676.9
1966	57.8	20.2	2.8	3.3	7.4	24.6	95.5	242.8	728.2
1967	55.0	18.4	2.6	3.0	8.7	26.0	97.0	225.8	686.7
1968	59.8	17.3	2.4	3.4	8.5	26.8	98.8	231.1	796.3
1969	64.3	17.4	2.6	3.6	9.5	33.6	115.8	281.9	818.5
1970	64.2	17.0	2.7	3.6	9.9	33.9	115.2	271.3	824.4
1971	61.5	16.5	2.3	2.5	9.6	28.2	100.5	241.5	823.0
1972	63.4	14.9	3.0	3.6	7.9	31.2	97.6	274.9	845.3
1973	63.1	11.9	2.7	3.1	8.7	29.6	106.1	257.2	850.0
1974	63.8	11.2	2.9	3.2	8.9	28.1	103.1	261.1	867.6
1975	65.7	9.0	2.7	3.6	7.5	28.3	107.3	251.2	912.3
1976	65.6	9.2	2.5	2.6	6.5	25.2	106.3	244.6	914.2
1977	59.0	7.7	2.3	3.4	8.0	25.3	89.2	232.5	801.4
FEMALE									
1950	46.8	66.0	4.2	3.8	8.3	12.2	33.6	80.4	397.7
1951	58.6	67.8	5.2	4.0	9.4	19.1	46.5	98.3	572.3
1952	41.7	62.1	3.7	4.6	7.5	11.7	26.1	58.7	325.2
1953	44.7	59.1	4.3	4.0	8.4	11.2	31.0	68.9	383.4
1954	37.1	48.9	2.4	3.1	6.4	10.8	23.3	49.6	322.1
1955	39.4	48.0	3.2	4.4	6.8	12.8	29.3	66.1	338.2
1956	40.5	47.4	2.3	3.1	6.5	11.0	26.5	59.6	377.6
1957	45.9	47.0	7.1	7.6	9.1	16.7	48.2	83.4	396.9
1958	38.4	40.5	3.5	4.9	7.9	9.5	30.1	61.7	368.6
1959	43.0	36.2	3.0	5.5	7.7	13.8	32.5	67.0	454.5
1960	36.3	32.9	2.8	3.9	6.0	11.1	29.0	64.4	362.1
1961	35.3	29.8	1.9	3.9	4.9	12.1	28.4	61.0	363.0
1962	35.6	29.2	2.1	3.1	6.5	11.0	24.7	57.1	376.1
1963	40.4	25.9	2.3	3.6	6.5	15.0	29.7	71.3	460.5
1964	30.6	21.5	1.7	2.4	5.6	10.3	28.5	50.1	330.4
1965	31.8	19.4	2.2	2.9	5.2	14.0	30.0	60.5	345.5
1966	33.9	17.3	1.9	3.8	8.2	13.1	31.6	61.8	383.2
1967	29.5	15.0	1.8	2.4	5.4	11.3	31.9	53.2	330.5
1968	35.3	14.2	1.9	3.6	6.6	13.6	34.0	67.8	413.4
1969	35.9	13.6	2.6	3.7	8.0	20.2	39.0	88.0	385.7
1970	36.3	14.5	2.6	4.2	7.7	17.8	41.4	77.7	386.9
1971	34.1	13.6	2.6	3.3	6.4	14.7	36.9	67.9	369.1
1972	35.8	11.1	2.2	3.1	7.7	15.9	39.8	75.8	392.4
1973	34.5	9.2	1.8	3.2	7.0	16.2	35.2	78.2	379.6
1974	34.3	8.4	1.7	2.6	5.9	15.6	37.5	75.0	378.0
1975	35.8	8.1	1.8	2.3	5.9	14.9	38.5	84.5	391.6
1976	37.3	6.8	1.2	2.0	5.9	13.9	37.3	80.0	418.0
1977	34.3	5.8	1.5	2.2	6.0	14.4	36.6	73.4	369.4

CANADIAN MORTALITY RATES, AND PSYCHIATRIC FIRST ADMISSION RATES, 1950-1977 - CONTINUED
DIGESTIVE DISEASE

	TOTAL	0-14	15-24	25-34	35-44	45-54	55-64	65-69	70 +
	PER 100,000 POPULATION								
MALE									
1950	10.5	1.4	0.8	2.0	6.4	18.8	28.5	41.8	71.8
1951	10.0	1.2	0.5	1.8	6.1	14.6	28.9	41.6	74.2
1952	9.5	1.1	0.4	1.6	5.9	14.5	29.8	40.8	65.0
1953	9.8	0.9	0.6	1.8	5.4	13.5	25.9	51.3	74.9
1954	9.0	0.7	0.2	2.1	4.7	14.4	25.1	45.3	66.9
1955	8.8	0.9	0.2	1.4	4.6	13.7	23.9	36.1	74.4
1956	8.8	1.0	0.6	1.2	3.2	13.0	24.7	41.7	74.1
1957	8.4	0.7	0.5	1.5	3.0	10.3	27.5	39.2	71.2
1958	8.6	0.4	0.6	1.6	4.2	10.8	24.8	41.2	77.1
1959	7.8	0.4	0.5	1.6	3.5	8.6	22.9	38.4	73.5
1960	8.4	0.2	0.3	1.0	3.2	10.0	27.0	36.1	81.1
1961	7.8	0.4	0.3	1.4	3.2	9.8	20.0	41.3	74.6
1962	8.0	0.2	0.2	0.7	2.9	9.3	20.7	40.5	83.9
1963	8.4	0.2	0.2	0.6	2.8	8.2	23.5	38.4	89.7
1964	8.5	0.2	0.5	1.3	2.7	10.7	22.7	39.2	88.1
1965	7.9	0.2	0.7	0.4	2.5	9.7	20.9	36.7	84.2
1966	7.9	0.2	0.2	0.6	2.4	8.0	21.4	43.5	84.3
1967	7.5	0.1	0.4	0.6	2.3	7.5	18.1	40.4	84.9
1968	6.8	0.2	0.1	1.1	2.3	5.3	18.7	39.0	73.4
1969	7.1	0.2	0.4	0.7	2.2	6.3	20.0	40.3	74.8
1970	6.7	0.2	0.2	0.6	2.8	5.8	16.3	32.0	77.4
1971	6.5	0.2	0.2	0.6	2.1	5.4	17.3	32.1	72.9
1972	6.0	0.1	0.3	0.7	1.7	5.4	15.6	25.1	68.0
1973	5.7	0.1	0.4	0.3	1.6	7.1	13.2	23.5	62.8
1974	5.3	0.1	0.4	0.4	1.6	5.0	12.6	24.3	58.4
1975	5.3	0.2	0.2	0.6	1.7	5.1	11.1	22.9	61.2
1976	4.4	0.1	0.1	0.4	0.6	3.8	10.2	18.0	51.0
1977	4.2	0.1	0.2	0.3	1.0	3.9	8.6	17.4	49.7
FEMALE									
1950	3.2	1.2	0.3	0.5	1.2	3.7	7.0	11.2	28.2
1951	3.1	1.0	0.1	0.7	1.7	2.2	6.0	11.7	31.0
1952	2.7	0.8	0.1	0.3	0.6	3.6	6.4	9.1	25.4
1953	2.7	0.8	0.3	0.3	1.4	2.5	5.4	12.2	24.1
1954	2.9	0.8	0.1	0.4	2.0	3.4	6.2	9.2	26.2
1955	2.3	0.6	0.1	0.5	0.8	3.2	5.6	10.3	19.1
1956	2.5	0.1	0.2	0.2	1.0	2.6	5.5	15.0	23.8
1957	2.6	0.3	0.0	0.8	1.4	2.9	4.0	9.6	27.4
1958	2.7	0.2	0.2	0.2	1.2	1.8	5.8	5.6	34.0
1959	3.2	0.1	0.1	0.5	1.2	2.4	6.1	8.0	38.9
1960	2.9	0.3	0.1	0.4	0.4	3.1	5.3	10.3	34.2
1961	2.7	0.1	0.0	0.1	1.3	3.4	6.5	9.3	27.7
1962	3.0	0.2	0.1	0.3	1.2	2.4	6.0	10.7	32.9
1963	2.9	0.2	0.5	0.1	1.1	2.0	5.4	10.9	32.1
1964	2.9	0.3	0.2	0.3	0.6	3.3	4.6	11.0	31.0
1965	2.8	0.2	0.3	0.5	1.0	1.7	5.9	8.9	30.6
1966	3.0	0.2	0.2	0.2	0.9	2.8	5.7	11.9	32.2
1967	2.8	0.2	0.1	0.5	1.4	1.9	4.1	13.7	28.1
1968	2.9	0.1	0.0	0.5	0.6	2.3	4.7	6.8	35.6
1969	2.9	0.1	0.2	0.3	1.3	1.7	4.1	8.9	32.5
1970	2.6	0.1	0.1	0.4	0.9	1.8	4.5	6.1	29.6
1971	2.8	0.1	0.1	0.1	0.7	2.2	5.7	7.7	28.8
1972	2.4	0.1	0.0	0.2	1.0	1.5	5.2	8.4	23.0
1973	2.7	0.1	0.0	0.4	0.6	1.3	4.1	5.2	30.3
1974	2.9	0.0	0.0	0.2	0.7	1.9	4.8	8.7	30.0
1975	2.4	0.1	0.2	0.1	0.6	1.5	3.6	4.1	26.0
1976	2.7	0.0	0.1	0.1	0.6	1.8	4.5	8.1	27.0
1977	2.3	0.0	0.0	0.1	0.3	1.0	3.5	7.8	24.3
CIRRHOSIS OF THE LIVER									
MALE									
1950	5.5	0.2	0.3	1.0	3.8	11.2	19.4	20.4	31.3
1951	5.4	0.3	0.3	0.8	3.1	11.1	18.9	25.0	28.5
1952	5.5	0.2	0.3	0.6	3.5	12.9	19.7	20.0	29.4
1953	6.1	0.2	0.3	0.9	5.8	14.6	21.5	20.7	28.9
1954	6.1	0.2	0.0	0.8	4.3	12.3	22.5	27.8	32.8
1955	6.4	0.4	0.3	1.0	4.2	13.1	22.2	32.7	33.2
1956	6.7	0.2	0.0	0.7	4.5	14.8	26.0	34.1	32.8
1957	7.8	0.2	0.2	1.4	6.2	16.8	29.2	36.3	39.0
1958	7.4	0.2	0.2	1.8	6.1	16.7	28.1	32.2	34.9
1959	7.5	0.2	0.2	0.9	5.5	17.5	31.0	32.5	36.6
1960	7.9	0.2	0.2	1.7	5.5	16.5	30.8	31.9	44.3
1961	7.7	0.1	0.1	1.0	6.4	15.1	30.7	35.5	42.6
1962	7.4	0.2	0.1	1.0	4.7	15.9	31.0	32.6	38.6
1963	7.1	0.2	0.1	1.5	5.7	16.6	26.7	33.9	34.0
1964	8.3	0.2	0.1	1.6	6.1	16.3	33.5	44.0	41.7
1965	8.3	0.3	0.1	1.2	8.5	18.5	30.1	35.5	41.5
1966	8.6	0.1	0.4	1.1	8.3	20.8	32.7	42.0	35.5
1967	9.1	0.2	0.1	1.6	8.9	20.8	35.1	39.6	41.2
1968	9.7	0.2	0.0	1.3	10.2	21.2	37.9	47.7	41.5
1969	10.1	0.3	0.2	1.6	10.9	23.4	38.0	47.9	39.8
1970	11.4	0.2	0.1	2.0	11.6	27.6	44.2	47.1	44.8
1971	12.0	0.2	0.0	1.4	12.3	32.5	42.6	51.7	45.1
1972	13.8	0.5	0.1	2.3	14.7	35.6	51.6	58.1	45.7
1973	15.8	0.6	0.1	2.7	16.3	39.9	60.5	69.0	49.7
1974	16.2	0.3	0.2	2.4	16.3	43.2	61.0	75.0	48.1
1975	16.7	0.2	0.3	2.7	17.2	42.0	61.3	69.8	58.1
1976	16.9	0.2	0.1	1.8	16.0	45.6	64.0	77.7	49.9
1977	16.7	0.5	0.2	2.5	15.0	43.1	60.1	68.4	59.0
FEMALE									
1950	3.4	0.3	0.6	0.9	2.4	6.9	10.7	13.7	17.9
1951	3.2	0.2	0.3	0.3	2.5	4.9	8.7	16.5	22.2
1952	3.5	0.2	0.4	0.8	2.2	5.9	11.5	16.2	21.3
1953	3.6	0.2	0.0	0.9	3.1	5.9	12.7	16.4	21.3
1954	3.6	0.2	0.0	1.1	3.2	6.4	12.8	14.2	19.7
1955	3.2	0.3	0.2	0.6	2.4	7.4	10.9	9.4	18.5
1956	3.6	0.2	0.1	0.8	3.8	9.4	9.7	11.5	19.0
1957	3.8	0.3	0.3	0.9	3.8	7.5	12.4	14.8	19.3
1958	3.9	0.3	0.2	1.4	3.7	8.1	12.5	16.4	18.9
1959	4.0	0.2	0.6	1.2	3.3	7.4	12.0	16.9	23.0
1960	4.3	0.2	0.5	1.0	3.4	8.0	15.9	19.8	21.6
1961	4.1	0.2	0.5	2.3	3.2	7.5	13.9	17.8	19.4
1962	3.9	0.1	0.2	0.8	3.9	9.2	11.5	16.6	19.4
1963	4.4	0.2	0.4	0.8	4.2	6.8	17.0	13.2	24.7
1964	4.4	0.3	0.2	0.8	3.1	9.8	14.8	19.7	21.0
1965	4.4	0.5	0.3	1.7	4.3	9.2	14.6	16.3	17.4
1966	4.9	0.3	0.3	1.3	4.5	10.6	17.0	18.8	20.0
1967	5.3	0.2	0.2	2.1	5.3	10.4	18.6	18.3	21.6
1968	5.0	0.1	0.1	1.3	4.3	11.6	17.4	23.6	18.4
1969	5.6	0.3	0.2	1.6	5.7	13.3	18.1	21.2	20.1
1970	5.6	0.2	0.1	1.6	5.4	11.2	20.4	19.8	21.8
1971	6.1	0.3	0.3	1.1	5.5	12.2	20.9	24.4	23.6
1972	6.8	0.4	0.2	1.5	6.3	13.9	25.5	25.7	22.5
1973	7.0	0.1	0.1	1.5	6.3	16.1	23.8	27.8	22.8
1974	7.3	0.3	0.2	1.8	6.9	17.3	23.1	28.1	23.1
1975	7.5	0.4	0.4	1.4	7.0	18.0	25.2	27.5	20.3
1976	7.4	0.2	0.3	1.8	5.7	16.9	25.5	29.8	20.8
1977	7.2	0.2	0.1	0.9	6.0	14.1	24.6	29.4	24.9

CANADIAN MORTALITY RATES, AND PSYCHIATRIC FIRST ADMISSION RATES, 1950-1977 - CONTINUED
GENITO-URINARY DISEASE

	TOTAL	0-14	15-24	25-34	35-44	45-54	55-64	65-69	70 +
	PER 100,000 POPULATION								
MALE									
1950	40.3	2.9	5.8	7.6	10.8	21.6	57.3	143.1	540.5
1951	37.0	2.5	3.6	6.3	9.3	25.3	62.1	131.1	478.2
1952	34.6	3.0	2.8	5.5	9.8	21.8	57.9	120.3	449.1
1953	31.1	3.4	3.6	6.0	8.2	19.6	47.9	117.3	392.2
1954	28.7	2.7	3.9	5.4	7.6	17.5	47.3	95.4	369.0
1955	28.6	2.9	5.1	5.4	7.9	16.8	40.6	98.0	379.2
1956	26.5	2.7	2.6	5.5	5.1	17.0	42.0	76.2	354.6
1957	24.5	2.1	3.3	5.2	8.0	14.8	35.9	86.0	315.3
1958	23.5	2.2	2.9	4.5	6.3	15.6	36.6	81.5	309.2
1959	22.0	1.4	2.1	3.8	5.7	11.0	31.7	76.9	309.0
1960	20.5	1.5	3.1	3.3	5.0	12.1	32.0	66.8	279.8
1961	20.5	1.3	3.3	3.7	5.6	13.4	30.2	67.2	277.4
1962	18.6	1.3	3.7	3.6	6.2	11.0	24.3	53.7	256.6
1963	19.7	1.2	2.6	2.8	6.6	10.4	26.8	63.7	277.7
1964	18.1	1.1	2.1	3.2	4.0	11.4	26.4	54.5	257.1
1965	17.2	1.1	2.1	2.4	3.3	10.1	23.1	61.0	248.1
1966	16.1	1.1	1.5	2.5	3.5	11.2	22.3	49.8	231.1
1967	15.3	1.0	1.0	2.6	4.0	7.2	21.0	57.7	221.1
1968	13.7	0.6	1.6	2.1	3.3	7.1	17.5	52.2	202.4
1969	12.8	0.5	1.0	1.8	3.6	6.4	17.8	46.5	189.7
1970	11.8	0.5	0.7	1.3	2.8	6.3	15.3	44.3	177.5
1971	12.2	0.5	1.0	1.6	3.8	6.3	18.0	40.2	177.6
1972	11.4	0.4	1.0	2.0	2.3	5.8	12.0	39.3	173.9
1973	11.1	0.5	0.8	1.2	2.7	4.7	16.9	32.2	165.3
1974	10.4	0.3	0.8	1.3	1.8	4.9	13.5	35.0	156.7
1975	10.2	0.4	0.5	0.8	2.1	5.8	13.4	36.4	148.5
1976	9.5	0.4	0.3	0.8	1.7	4.6	12.6	31.6	141.0
1977	9.9	0.1	0.4	1.0	2.1	4.7	13.0	32.5	144.5
FEMALE									
1950	27.5	2.2	3.9	4.6	13.5	24.1	50.6	104.3	306.7
1951	24.5	2.3	2.9	6.3	9.7	21.2	45.6	83.7	275.7
1952	21.4	2.3	3.2	5.4	9.1	23.3	38.0	81.1	214.1
1953	20.4	1.5	2.1	4.7	10.2	23.0	37.1	68.0	213.9
1954	17.9	1.6	3.0	4.3	8.1	19.6	31.5	71.2	181.7
1955	17.7	2.4	2.2	4.1	8.7	13.9	33.9	62.1	187.0
1956	17.1	1.9	3.4	4.1	7.2	15.1	32.8	57.8	178.7
1957	15.5	1.7	3.2	4.6	5.8	12.8	27.8	59.8	161.5
1958	14.1	1.8	1.7	3.2	6.8	12.0	23.9	46.1	153.8
1959	13.7	1.0	3.1	3.7	5.4	12.6	25.7	42.6	145.2
1960	12.6	1.4	2.1	2.9	5.5	10.9	22.9	44.2	134.5
1961	12.1	1.3	2.4	3.0	5.3	11.3	20.8	37.6	126.3
1962	12.5	1.4	3.1	3.3	6.0	10.1	22.0	37.6	128.2
1963	12.2	1.1	2.2	3.1	5.0	10.0	23.0	36.1	128.2
1964	11.2	1.1	2.2	2.8	4.4	7.1	21.3	35.3	117.5
1965	10.6	1.0	2.1	2.4	4.7	8.4	16.6	36.0	109.4
1966	10.5	1.1	1.5	3.0	5.4	8.0	17.5	35.8	104.4
1967	10.0	1.0	1.9	2.4	3.9	7.0	15.8	32.1	102.7
1968	9.3	0.7	0.9	1.9	3.9	7.1	15.4	27.7	97.7
1969	8.6	0.6	1.0	1.7	2.5	5.2	14.0	31.8	89.9
1970	8.2	0.4	1.2	1.6	3.6	5.8	14.4	22.4	82.1
1971	7.5	0.3	0.5	1.7	2.6	5.8	13.3	23.2	74.9
1972	7.9	0.5	0.8	1.4	2.9	5.8	11.8	26.0	78.8
1973	7.1	0.4	0.7	1.1	2.8	4.2	10.5	17.7	73.4
1974	7.2	0.5	0.4	1.0	2.0	4.6	9.5	20.8	74.8
1975	7.3	0.5	0.4	1.2	1.7	4.6	9.6	20.7	75.6
1976	7.2	0.4	0.5	0.8	1.8	3.4	9.2	23.0	74.1
1977	7.1	0.3	0.5	0.7	2.2	3.0	8.1	19.9	73.4
SUICIDE									
MALE									
1950	11.8	0.1	6.9	7.5	16.9	24.1	31.0	30.0	29.1
1951	11.0	0.0	5.5	10.0	15.1	23.5	26.2	25.9	28.8
1952	11.0	0.1	5.7	9.3	14.7	20.6	31.1	35.2	24.6
1953	10.9	0.2	5.7	10.1	16.6	20.6	27.1	27.2	27.4
1954	10.8	0.2	5.1	11.0	15.2	22.7	27.1	26.5	25.9
1955	10.6	0.1	4.3	10.4	14.9	22.3	27.7	29.7	25.4
1956	11.6	0.2	5.4	11.6	14.9	23.0	33.2	32.8	29.1
1957	11.6	0.1	6.5	12.4	16.2	23.2	32.4	31.2	24.6
1958	11.8	0.4	6.6	12.0	16.5	25.3	34.0	26.3	24.3
1959	11.2	0.2	6.0	12.5	16.1	23.1	29.1	29.6	24.6
1960	12.0	0.2	8.5	15.2	16.4	24.1	29.4	24.8	25.9
1961	11.8	0.2	6.0	12.0	18.2	25.0	29.5	32.1	28.3
1962	11.1	0.3	7.7	12.8	15.9	25.3	28.8	22.3	19.1
1963	11.3	0.4	8.7	12.8	18.2	21.5	27.1	22.9	24.2
1964	12.3	0.4	8.1	15.5	18.6	25.6	30.7	23.4	22.8
1965	12.9	0.4	9.2	14.9	19.9	25.8	31.8	31.1	23.8
1966	12.7	0.5	10.1	15.0	19.1	25.9	28.7	25.1	24.7
1967	13.3	0.3	12.0	17.6	19.4	24.9	29.0	28.5	21.9
1968	14.3	0.4	11.8	19.3	21.9	26.2	32.9	27.8	22.1
1969	15.6	0.4	15.5	17.6	24.6	29.3	31.4	22.9	30.4
1970	16.3	0.4	15.9	20.2	26.9	28.1	31.6	28.8	25.2
1971	17.4	0.4	17.6	21.7	27.5	31.3	33.6	24.0	25.3
1972	17.5	0.5	21.1	22.3	25.5	30.4	27.8	23.8	24.7
1973	18.0	0.6	20.3	21.2	26.1	30.8	33.6	30.6	23.0
1974	18.9	0.4	24.6	23.5	27.3	29.4	25.7	27.7	28.6
1975	18.0	0.7	22.8	22.6	24.4	26.6	28.2	28.5	22.9
1976	18.4	0.6	22.6	25.7	24.1	29.4	25.1	19.8	24.0
1977	21.3	0.8	29.0	26.9	28.3	32.3	25.8	29.3	25.7
FEMALE									
1950	3.5	--	2.2	4.4	5.8	7.2	6.4	9.7	3.8
1951	3.5	--	2.2	3.2	4.9	8.1	9.4	8.3	6.1
1952	3.3	--	1.6	2.6	5.2	8.2	9.0	6.7	6.1
1953	3.2	--	1.9	3.2	5.4	7.0	7.6	7.5	3.1
1954	3.5	--	1.9	3.6	6.3	7.3	8.0	8.7	4.3
1955	3.4	--	1.6	4.3	5.8	6.6	8.9	4.0	5.5
1956	3.4	--	1.3	3.9	5.0	9.3	8.6	7.5	4.8
1957	3.2	--	1.1	4.5	4.6	9.0	7.1	7.0	4.2
1958	2.9	--	1.7	3.2	5.9	7.0	6.6	4.3	3.1
1959	2.9	--	0.9	2.4	5.3	6.4	7.7	9.3	5.2
1960	3.0	--	1.7	4.1	3.8	6.6	7.7	6.2	5.5
1961	3.0	--	1.6	3.6	4.6	8.0	5.8	7.3	4.0
1962	3.1	--	1.9	4.4	5.1	7.0	6.1	5.9	3.3
1963	3.8	--	2.7	5.2	5.9	8.9	7.3	7.0	4.8
1964	4.1	--	2.5	5.6	7.3	9.4	8.8	8.3	3.5
1965	4.5	--	2.3	5.9	7.9	10.1	10.4	8.5	5.9
1966	4.3	--	2.1	5.6	7.6	10.6	11.7	4.3	4.2
1967	4.9	--	2.8	6.8	9.7	10.0	9.8	8.8	5.9
1968	5.2	--	3.2	6.7	11.2	11.3	8.7	9.9	5.3
1969	6.3	--	4.0	7.9	10.3	14.7	14.6	9.3	5.2
1970	6.4	--	4.8	8.8	10.8	14.6	11.3	11.2	5.5
1971	6.5	--	4.4	7.8	11.7	14.8	12.4	9.6	6.1
1972	7.0	--	5.1	10.2	13.2	12.7	11.4	10.7	6.9
1973	7.1	--	5.1	9.8	9.8	14.0	14.9	13.3	7.7
1974	7.2	--	5.0	9.7	12.1	14.8	12.8	11.8	5.6
1975	6.9	--	6.2	8.2	12.3	13.5	10.1	12.0	5.7
1976	7.2	--	6.2	9.7	11.6	12.6	12.8	8.4	6.6
1977	7.4	--	5.9	9.2	10.2	14.9	13.2	11.1	6.2

CANADIAN MORTALITY RATES, AND PSYCHIATRIC FIRST ADMISSION RATES, 1950-1977 - CONTINUED
NON-TRAFFIC ACCIDENTS

	TOTAL	0-14	15-24	25-34	35-44	45-54	55-64	65-69	70 +
	PER 100,000 POPULATION								
MALE									
1950	53.7	42.9	45.3	40.7	47.0	52.4	62.9	81.8	182.6
1951	55.0	40.2	49.5	46.6	45.0	55.5	68.4	84.2	181.6
1952	56.5	42.6	58.9	52.8	45.7	51.0	63.8	69.9	175.6
1953	53.7	39.5	58.1	44.1	43.7	53.9	63.3	62.6	172.1
1954	52.3	38.9	49.8	51.8	42.7	49.2	59.7	59.5	171.6
1955	52.8	37.7	54.9	49.5	42.1	52.5	51.4	77.2	177.6
1956	49.1	34.4	49.4	45.8	41.5	47.0	53.4	63.6	168.4
1957	50.7	35.7	50.0	44.8	45.5	49.4	57.4	79.7	164.7
1958	46.9	34.1	43.5	46.1	41.5	46.6	51.1	54.3	155.8
1959	46.7	33.2	48.1	47.2	37.8	43.1	55.9	56.6	152.3
1960	44.9	33.0	43.4	39.4	38.4	47.1	50.3	68.1	143.1
1961	44.8	32.4	41.6	39.9	38.6	46.8	58.3	56.7	143.9
1962	43.2	30.4	36.8	40.9	40.4	41.0	52.8	61.1	150.4
1963	43.2	31.1	37.9	41.0	41.3	46.1	49.7	57.2	135.8
1964	42.3	29.4	37.3	38.2	42.1	42.2	52.6	49.7	145.4
1965	42.2	28.0	35.6	39.5	39.7	45.3	52.5	65.3	146.9
1966	43.7	28.1	37.6	44.0	41.9	46.4	54.3	60.8	149.7
1967	43.3	27.6	39.2	37.1	43.1	45.3	56.3	64.2	149.9
1968	41.8	24.4	34.3	37.5	41.8	47.4	57.6	63.8	154.5
1969	42.1	23.3	36.9	38.7	40.6	48.8	54.8	65.4	157.9
1970	41.2	23.9	37.9	37.1	41.8	51.0	54.6	58.0	128.1
1971	42.3	23.5	36.9	39.9	42.8	49.6	54.3	55.7	149.0
1972	42.8	23.5	40.8	37.7	42.8	51.4	55.4	61.7	138.1
1973	44.5	22.1	43.0	38.2	44.9	54.3	55.6	70.6	150.6
1974	43.1	21.0	40.4	38.6	40.7	49.3	61.1	68.7	146.8
1975	41.8	19.3	39.9	35.5	42.1	48.4	54.7	67.0	144.1
1976	38.1	18.6	35.5	32.4	34.8	42.2	54.7	53.8	134.8
1977	36.5	15.4	33.7	30.0	35.6	41.3	50.5	52.1	139.8
FEMALE									
1950	23.3	22.2	5.1	4.5	7.1	9.4	15.9	31.0	237.9
1951	21.9	21.8	5.4	4.6	6.0	8.1	14.6	26.3	216.5
1952	21.2	23.4	5.7	4.9	5.5	8.9	10.2	27.2	191.3
1953	21.6	20.1	5.7	6.1	7.0	7.4	13.9	29.1	205.2
1954	21.2	21.0	5.0	5.6	8.7	8.8	13.4	24.4	187.9
1955	21.4	21.9	6.3	5.7	6.3	11.4	14.6	25.2	179.7
1956	22.0	21.3	4.4	4.8	6.1	10.1	17.5	24.7	201.2
1957	21.7	21.1	6.0	7.3	6.5	10.2	19.7	25.3	178.6
1958	19.3	19.4	5.0	5.0	5.2	10.2	11.5	17.2	168.2
1959	19.0	18.6	5.9	5.7	5.7	8.8	12.4	22.8	157.0
1960	19.4	18.1	4.9	5.1	7.0	9.4	12.4	21.1	167.1
1961	18.9	17.5	3.9	5.1	6.4	9.2	13.2	24.3	160.7
1962	19.5	18.1	4.1	6.5	7.0	9.6	13.0	23.4	161.9
1963	18.6	17.0	6.3	5.3	6.5	9.9	12.1	21.7	150.5
1964	17.7	16.2	5.6	4.6	6.7	8.8	15.3	18.6	139.9
1965	18.9	15.8	5.1	5.5	7.9	14.5	16.6	22.3	145.5
1966	17.6	15.1	4.3	6.2	7.3	10.7	15.2	21.0	136.9
1967	18.7	15.6	5.6	6.4	8.3	11.2	18.5	22.9	138.8
1968	18.2	14.0	6.5	6.7	8.7	13.6	15.8	20.5	133.8
1969	17.1	12.8	5.6	5.9	7.6	13.7	15.1	19.1	128.2
1970	18.3	12.3	7.1	10.0	10.3	15.0	17.1	20.5	125.3
1971	18.5	12.3	7.0	7.0	10.5	12.9	17.8	25.0	133.3
1972	18.4	11.4	6.9	7.2	9.6	14.8	18.7	23.6	131.8
1973	17.4	11.0	7.9	6.7	9.6	13.9	17.0	26.3	116.6
1974	18.1	10.7	7.8	6.5	8.5	14.8	19.2	27.2	126.0
1975	18.6	11.5	7.0	7.3	11.4	11.5	18.5	25.1	130.3
1976	16.2	8.9	5.3	5.2	8.5	12.4	17.9	24.8	115.6
1977	16.4	10.1	6.3	5.4	9.2	13.3	14.3	22.6	111.7
TRAFFIC ACCIDENTS									
MALE									
1950	23.8	14.9	30.4	23.0	19.5	24.1	30.3	30.4	57.6
1951	27.9	16.8	35.4	28.2	25.6	30.1	33.8	40.8	58.5
1952	29.7	16.6	41.2	33.7	26.7	28.4	35.0	46.0	57.8
1953	30.6	16.2	41.5	36.0	27.6	27.0	38.7	50.5	64.9
1954	26.5	15.0	40.3	29.0	24.1	22.7	32.4	36.8	52.6
1955	27.8	14.3	43.0	32.3	22.6	28.2	31.5	40.7	59.4
1956	32.2	15.0	49.6	41.5	28.3	31.8	38.5	42.1	65.8
1957	32.6	14.3	50.9	40.1	28.4	32.0	41.4	51.0	69.7
1958	30.1	14.6	46.6	36.4	30.3	28.1	33.8	38.6	64.2
1959	29.9	13.6	52.1	35.6	27.3	29.1	34.9	41.4	58.1
1960	29.6	14.6	49.5	35.6	26.5	29.9	34.7	44.5	53.7
1961	31.0	15.0	51.6	36.6	30.6	31.5	35.0	44.2	55.7
1962	33.6	14.9	56.5	41.8	35.2	32.8	41.0	40.9	57.6
1963	33.8	14.4	58.3	42.7	32.2	34.4	38.9	47.8	60.2
1964	36.0	15.6	65.1	42.5	35.1	34.5	41.9	49.3	61.2
1965	36.7	15.7	65.2	46.6	33.8	33.4	45.4	49.4	58.8
1966	38.9	15.7	74.0	47.4	34.7	36.1	43.2	53.7	61.9
1967	38.9	16.2	73.8	45.0	35.1	38.0	46.7	58.8	59.6
1968	38.0	15.6	74.8	41.6	33.5	34.9	41.0	37.9	58.7
1969	39.5	16.4	75.1	47.5	31.1	34.1	42.7	55.2	56.7
1970	36.1	14.8	70.5	40.9	29.6	30.6	34.6	44.6	54.8
1971	37.9	15.1	73.5	44.1	33.0	33.5	35.8	45.6	48.0
1972	42.7	15.4	89.4	45.1	35.3	34.4	36.8	53.1	62.3
1973	42.9	15.0	92.2	45.9	29.9	35.6	38.1	44.8	59.8
1974	41.3	14.8	89.1	42.4	32.8	30.8	35.7	46.0	50.0
1975	37.8	12.5	80.9	39.3	30.2	28.3	32.5	40.5	45.9
1976	32.9	11.4	68.2	35.8	23.7	24.9	27.6	35.2	41.3
1977	32.9	11.4	69.6	35.4	23.8	23.1	26.9	32.2	40.2
FEMALE									
1950	7.6	7.7	6.8	4.4	5.3	8.2	7.6	15.8	19.8
1951	8.4	9.1	9.8	4.0	6.1	7.5	11.0	8.8	17.9
1952	9.7	10.5	10.6	5.5	5.9	9.3	12.0	13.4	21.6
1953	10.3	10.1	11.2	6.0	6.7	9.1	17.2	14.1	21.9
1954	9.5	8.6	11.4	7.1	6.5	8.8	9.4	15.6	23.2
1955	9.5	9.1	9.6	6.0	7.4	7.1	13.4	16.2	22.5
1956	10.6	9.4	11.3	7.7	8.1	8.9	15.2	23.0	22.5
1957	10.1	8.3	12.9	7.4	5.9	9.5	13.3	21.8	23.4
1958	9.9	8.0	11.2	7.3	7.8	11.9	13.0	16.0	18.9
1959	10.7	9.8	11.5	7.9	8.1	9.2	14.3	21.9	21.8
1960	10.6	8.8	14.2	6.7	8.2	10.1	12.9	17.8	23.4
1961	10.2	8.0	12.8	7.3	8.3	9.7	15.4	17.4	19.2
1962	11.6	7.7	16.2	9.6	8.4	12.5	18.2	18.6	22.1
1963	12.1	8.9	16.6	9.5	8.0	12.7	17.0	17.4	25.3
1964	13.0	9.8	17.6	9.6	10.1	12.7	17.5	19.0	26.3
1965	13.7	9.4	18.8	11.9	8.9	14.0	19.6	19.7	28.2
1966	14.1	10.3	21.1	10.4	11.5	12.6	19.7	17.7	23.3
1967	15.4	11.3	20.5	11.5	10.2	17.8	19.9	28.2	26.2
1968	14.7	9.7	21.8	11.9	10.8	14.9	19.8	21.6	23.9
1969	14.4	9.2	22.0	12.3	10.7	14.1	17.5	25.1	22.3
1970	13.5	9.1	18.6	11.5	11.3	11.5	16.8	19.5	24.2
1971	15.0	10.3	22.7	11.7	12.4	12.2	18.3	24.7	21.9
1972	15.3	9.2	23.8	13.5	10.5	14.3	17.8	22.1	24.7
1973	16.6	10.1	25.9	13.2	12.1	15.0	20.1	23.5	28.1
1974	15.4	10.9	25.0	12.0	10.5	12.1	15.2	20.6	26.5
1975	14.4	8.6	21.0	11.1	11.5	12.8	17.5	18.0	26.5
1976	12.3	7.2	18.6	9.5	8.9	11.3	14.9	18.0	20.7
1977	12.2	7.3	18.2	9.5	10.0	11.3	15.6	15.8	17.8

CANADIAN MORTALITY RATES, AND PSYCHIATRIC FIRST ADMISSION RATES, 1950-1977 - CONTINUED
HOMICIDE

	TOTAL	0-14	15-24	25-34	35-44	45-54	55-64	65-69	70 +
	PER 100,000 POPULATION								
MALE									
1950	1.2	0.2	0.8	2.1	1.9	2.5	0.5	1.4	0.9
1951	1.1	0.4	1.3	1.4	1.4	1.9	0.7	1.8	2.5
1952	1.2	0.6	1.3	1.4	1.5	2.1	1.4	3.0	0.9
1953	1.3	0.6	1.2	2.0	1.8	2.1	0.9	0.4	1.7
1954	1.3	0.4	1.8	1.3	1.6	1.3	2.4	2.6	1.1
1955	1.3	0.7	1.6	1.5	1.8	1.6	1.7	2.1	1.3
1956	1.3	0.6	1.6	1.3	1.6	1.3	2.6	1.3	1.3
1957	1.2	0.5	1.3	1.9	1.5	1.4	2.3	0.8	1.5
1958	1.4	0.8	1.4	1.9	1.8	2.0	0.8	1.3	2.0
1959	1.3	0.7	1.8	2.2	1.4	1.4	1.4	1.7	1.0
1960	1.7	0.6	1.6	2.2	2.3	2.2	3.0	1.3	3.3
1961	1.4	0.3	0.9	2.6	2.1	2.4	1.5	2.5	3.2
1962	1.7	0.7	1.4	3.0	2.7	3.0	1.9	1.7	1.8
1963	1.6	0.5	1.3	2.4	2.5	1.9	2.3	2.9	2.0
1964	1.5	0.5	1.5	2.3	2.7	1.9	1.8	2.0	1.8
1965	1.6	0.6	1.5	2.7	2.1	2.1	1.9	0.8	3.3
1966	1.5	0.9	1.4	2.4	1.8	2.1	1.6	1.6	2.4
1967	1.8	0.6	1.8	3.0	3.0	2.7	1.4	2.7	2.4
1968	2.0	0.6	1.9	4.0	3.5	2.1	2.3	1.5	3.2
1969	2.4	0.7	2.5	4.7	4.1	2.8	2.0	4.0	2.7
1970	2.4	0.9	2.4	3.8	3.3	3.2	3.6	4.2	2.1
1971	2.8	0.7	3.5	4.7	3.9	4.0	3.5	2.0	2.3
1972	2.9	0.6	3.5	4.8	4.6	4.3	2.7	3.0	3.0
1973	3.1	0.7	3.2	4.6	5.4	4.8	3.6	1.9	3.6
1974	3.1	1.0	4.1	4.2	4.7	3.8	3.3	2.8	2.3
1975	3.6	0.8	4.5	5.8	4.7	4.0	4.3	2.4	3.6
1976	3.2	0.8	3.3	4.7	4.3	4.5	4.5	3.2	3.9
1977	3.5	1.1	3.9	5.3	4.6	5.1	3.3	2.6	2.4
FEMALE									
1950	0.5	0.3	0.6	0.6	1.2	0.9	0.0	0.5	0.3
1951	0.8	0.3	0.4	1.0	1.7	0.9	1.3	1.5	0.9
1952	0.7	0.5	0.7	0.7	1.1	1.0	0.6	0.0	0.3
1953	0.8	0.7	0.8	0.9	0.8	1.3	0.7	0.9	0.3
1954	0.8	0.5	1.2	0.9	1.5	0.4	1.6	0.5	0.3
1955	0.7	0.4	0.5	1.1	1.3	1.1	0.4	0.0	1.0
1956	0.9	0.8	0.5	1.1	1.7	1.3	0.9	0.0	0.0
1957	0.8	0.5	0.8	0.8	1.2	1.5	0.2	0.0	1.5
1958	1.0	0.8	1.0	1.3	1.5	0.6	0.3	0.9	1.2
1959	0.6	0.4	0.3	0.9	0.9	0.6	1.5	0.4	0.5
1960	1.0	0.4	1.3	1.7	1.5	0.9	0.8	1.2	1.1
1961	0.9	0.4	0.7	1.2	1.5	1.3	1.3	0.0	0.6
1962	1.0	0.5	1.4	1.2	1.6	1.2	0.9	0.4	0.8
1963	1.0	0.3	1.3	1.2	1.7	0.9	1.5	1.2	1.4
1964	1.0	0.4	1.1	1.9	1.4	1.0	0.6	1.1	1.4
1965	1.0	0.8	1.3	1.2	1.5	1.2	1.1	0.4	0.2
1966	0.9	0.5	1.2	1.2	1.0	1.0	1.2	1.1	1.1
1967	1.3	0.9	1.2	2.1	2.1	1.2	0.8	0.7	0.5
1968	1.2	0.4	1.5	2.6	1.3	1.7	1.0	0.7	1.0
1969	1.1	0.8	1.5	1.7	1.6	0.8	1.3	0.7	0.5
1970	1.5	0.9	1.7	2.5	1.8	1.6	1.3	1.6	1.6
1971	1.5	0.7	1.9	2.2	2.3	1.5	1.1	0.3	1.3
1972	1.7	0.7	2.9	2.3	1.5	2.0	1.6	0.0	0.9
1973	1.7	0.7	2.2	2.8	2.5	2.1	1.1	0.6	1.5
1974	1.8	0.9	2.4	2.7	1.8	2.0	1.7	2.0	1.3
1975	1.8	1.0	2.5	2.7	2.2	1.8	1.3	0.5	1.4
1976	1.6	1.1	1.8	2.2	2.7	1.5	1.2	1.0	1.1
1977	1.7	0.7	1.9	2.7	2.2	1.5	1.7	1.3	1.7
HEART DISEASE									
MALE									
1950	339.5	2.0	7.1	18.6	83.2	324.4	888.2	1618.4	3693.0
1951	338.0	1.3	5.7	19.9	84.9	324.5	891.2	1524.3	3722.9
1952	341.1	1.5	4.3	20.5	94.3	334.7	909.6	1609.6	3678.4
1953	338.5	1.0	4.4	15.8	90.1	341.2	913.2	1613.0	3643.8
1954	332.3	1.1	4.5	15.9	85.6	321.9	885.3	1594.1	3645.6
1955	337.0	0.7	4.7	16.0	81.4	316.8	899.5	1653.2	3740.3
1956	334.0	0.9	3.4	16.5	86.4	310.7	900.8	1625.8	3710.4
1957	338.3	0.7	3.1	18.0	87.0	331.1	918.4	1716.6	3752.4
1958	333.1	0.4	3.2	15.1	88.9	341.5	916.4	1668.2	3723.7
1959	338.5	0.8	2.9	16.2	87.5	334.7	903.3	1678.5	3861.4
1960	340.5	0.7	2.7	13.7	86.4	340.8	930.0	1641.6	3887.3
1961	337.5	0.7	3.3	14.1	87.4	341.2	896.4	1649.1	3853.8
1962	337.7	0.7	3.4	14.1	83.9	337.6	892.6	1659.8	3883.6
1963	335.9	0.9	3.1	14.2	82.8	326.6	898.0	1663.0	3875.1
1964	336.0	0.9	2.6	12.4	84.2	338.6	908.7	1636.1	3867.7
1965	341.7	0.7	2.4	14.5	88.8	336.8	911.9	1635.9	3989.3
1966	330.4	0.6	2.8	11.6	82.7	338.8	882.2	1621.8	3839.7
1967	330.7	0.6	2.8	10.5	84.7	343.7	889.7	1577.7	3855.9
1968	329.0	0.6	2.4	11.9	80.1	323.6	862.3	1655.9	3876.3
1969	317.9	0.5	2.1	9.7	74.9	303.0	808.8	1596.8	3799.1
1970	317.1	0.8	1.8	9.8	72.6	298.2	843.6	1604.0	3703.0
1971	311.3	0.4	1.9	8.8	72.0	297.5	801.0	1499.2	3673.0
1972	315.1	0.6	2.1	9.1	68.2	281.1	812.4	1553.5	3699.4
1973	310.8	0.6	2.2	9.4	73.3	273.6	791.8	1483.1	3635.0
1974	314.5	0.9	2.6	8.6	68.3	286.2	782.4	1487.6	3675.2
1975	304.0	0.9	2.0	10.0	67.4	275.0	763.7	1474.3	3458.3
1976	306.0	1.1	2.1	9.5	63.2	278.6	754.7	1404.4	3480.4
1977	303.4	0.9	1.9	9.0	66.1	273.4	753.8	1387.2	3381.1
FEMALE									
1950	234.3	2.0	5.3	12.8	42.8	135.3	409.6	1011.7	3204.0
1951	233.5	1.4	5.4	11.7	42.8	125.9	425.3	947.9	3196.7
1952	229.6	1.4	3.2	11.8	38.0	127.5	421.6	925.1	3131.8
1953	230.4	1.5	3.9	10.3	37.9	130.8	406.1	969.5	3113.1
1954	218.2	1.0	3.2	9.4	32.4	116.9	384.2	924.6	2955.5
1955	220.1	1.3	4.4	7.7	27.6	101.2	377.1	920.8	3042.0
1956	221.4	1.0	2.7	7.1	27.0	101.3	387.1	880.4	3074.9
1957	219.2	0.6	2.5	7.1	28.0	103.4	376.2	909.6	3033.5
1958	216.0	0.9	2.1	7.0	26.9	102.2	359.2	887.0	3005.2
1959	222.7	0.9	2.8	7.6	25.8	99.5	357.1	881.5	3102.5
1960	218.0	0.7	2.4	7.3	22.7	100.1	361.0	840.6	3013.2
1961	217.5	0.4	2.8	7.7	20.9	96.1	334.9	890.1	2982.1
1962	217.7	0.4	2.4	7.2	21.6	85.5	345.3	830.4	2994.0
1963	220.7	0.6	2.4	6.0	21.5	85.3	334.0	836.0	3030.7
1964	216.1	0.6	1.9	6.5	20.3	85.4	312.1	798.5	2964.3
1965	218.9	0.8	2.4	6.1	20.7	84.2	308.5	755.9	3004.2
1966	215.5	0.5	1.9	6.0	19.2	80.9	313.3	760.1	2902.2
1967	211.4	0.5	1.6	5.0	18.2	81.9	304.5	739.9	2799.8
1968	212.3	0.6	0.7	4.7	21.2	72.2	284.2	711.5	2818.3
1969	209.9	0.4	0.9	4.5	19.6	72.9	278.7	692.0	2737.9
1970	208.3	0.5	1.5	4.7	17.5	66.1	263.2	702.8	2685.3
1971	205.5	0.5	1.3	3.4	17.1	66.3	242.9	651.4	2634.8
1972	208.3	0.4	0.9	3.2	16.3	59.7	252.8	623.6	2645.3
1973	210.3	0.7	1.7	3.7	17.7	61.7	252.9	609.4	2618.3
1974	213.9	0.8	0.9	3.3	16.5	66.7	248.5	613.7	2627.3
1975	205.7	0.6	1.1	3.0	14.9	63.6	243.4	613.7	2461.0
1976	206.0	0.8	1.4	2.9	14.3	58.9	223.8	591.2	2444.1
1977	205.4	0.6	1.4	4.2	15.6	63.3	218.7	557.1	2390.0

CANADIAN MORTALITY RATES, AND PSYCHIATRIC FIRST ADMISSION RATES, 1955-1977 - CONTINUED
DISEASES OF ARTERIES

	TOTAL	0-14	15-24	25-34	35-44	45-54	55-64	65-69	70 +
	PER 100,000 POPULATION								
MALE									
1950	21.3	--	0.8	0.8	1.5	6.6	20.6	47.3	374.4
1951	21.3	--	0.2	0.3	0.5	5.6	20.8	50.9	378.3
1952	20.1	--	0.2	0.2	1.2	6.9	22.4	51.7	343.2
1953	18.8	--	0.0	0.2	1.4	4.9	19.7	50.5	322.8
1954	19.7	--	0.4	0.7	1.7	3.5	22.8	59.5	330.8
1955	18.8	--	0.4	0.6	1.0	6.2	16.2	56.5	320.1
1956	20.3	--	0.3	0.5	1.6	5.5	24.2	55.6	339.5
1957	19.8	--	0.1	0.8	1.1	5.2	25.9	56.1	331.2
1958	18.5	--	0.2	0.2	1.5	5.0	23.2	53.0	314.4
1959	18.6	--	0.0	0.6	1.5	4.2	16.4	57.5	319.1
1960	19.4	--	0.5	0.5	1.6	4.7	24.2	63.4	324.1
1961	19.5	--	0.2	0.3	1.8	5.1	24.3	58.8	325.7
1962	19.5	--	0.3	0.6	1.4	5.8	24.8	65.2	322.4
1963	20.0	--	0.3	0.1	1.5	5.3	28.0	73.5	326.2
1964	20.8	--	0.0	0.4	1.4	5.8	26.3	67.9	349.5
1965	21.9	--	0.1	0.6	1.4	7.8	27.5	76.9	363.4
1966	22.0	--	0.1	0.5	1.3	4.5	33.0	85.1	363.7
1967	22.4	--	0.2	0.5	1.6	6.0	30.2	78.8	377.4
1968	22.8	--	0.5	0.6	1.4	5.3	31.9	83.7	382.3
1969	25.6	--	0.6	0.6	2.3	8.7	40.5	101.3	410.0
1970	26.1	--	0.3	0.5	1.3	9.6	36.3	100.5	428.4
1971	26.3	--	0.1	0.5	1.6	9.7	38.1	95.2	430.7
1972	26.2	--	0.5	0.8	2.2	7.8	39.1	90.1	425.9
1973	28.6	--	0.1	0.6	2.3	8.2	40.1	101.5	465.1
1974	27.9	--	0.5	0.5	2.2	8.2	39.7	102.4	445.1
1975	27.4	--	0.4	1.1	1.1	6.9	39.0	102.2	435.4
1976	26.9	--	0.4	0.4	2.5	9.4	34.3	95.1	420.3
1977	25.9	--	0.2	0.7	1.6	7.4	36.3	95.4	398.1
FEMALE									
1950	18.8	--	0.6	1.0	2.0	4.3	12.1	31.5	339.0
1951	17.7	--	0.6	0.8	0.9	3.4	9.8	28.7	325.1
1952	16.6	--	0.7	0.3	1.2	2.6	9.0	25.3	303.0
1953	16.4	--	0.5	1.0	0.8	2.0	10.5	26.3	293.9
1954	16.3	--	0.6	0.8	0.6	2.0	8.1	30.8	289.4
1955	15.8	--	0.3	0.4	1.4	4.2	6.8	24.7	280.2
1956	16.5	--	0.5	1.0	0.9	2.3	7.9	25.6	293.6
1957	16.1	--	0.5	1.0	1.2	2.6	9.8	25.3	280.2
1958	15.4	--	0.2	0.8	0.5	1.8	6.4	27.6	273.2
1959	15.6	--	0.6	0.6	1.0	2.0	7.1	23.2	273.4
1960	15.8	--	0.6	0.4	1.0	1.9	7.2	27.7	272.3
1961	16.4	--	0.7	0.5	0.9	2.7	9.5	24.7	278.5
1962	17.0	--	0.4	1.3	1.6	3.2	6.9	22.6	286.6
1963	17.1	--	0.5	0.5	1.3	2.3	8.9	29.5	284.5
1964	16.7	--	0.5	0.9	1.4	2.8	8.4	27.7	274.7
1965	18.7	--	0.5	0.7	1.1	3.8	8.3	32.7	303.3
1966	18.6	--	0.2	1.2	1.3	2.6	7.6	29.3	303.4
1967	18.9	--	0.2	1.0	1.2	3.7	9.7	31.4	297.2
1968	20.2	--	0.2	0.5	1.3	4.3	12.1	28.1	313.8
1969	21.5	--	0.1	0.7	1.6	4.2	11.3	38.7	326.1
1970	21.4	--	0.3	0.3	0.9	3.7	12.1	28.4	326.5
1971	23.3	--	0.2	0.6	1.4	2.6	12.6	37.4	347.2
1972	24.3	--	0.1	0.7	1.3	3.9	12.1	37.3	356.2
1973	24.8	--	0.3	0.2	1.7	4.5	13.1	35.3	357.0
1974	24.3	--	0.3	0.3	1.0	3.4	12.8	30.6	348.0
1975	23.9	--	0.1	0.5	1.1	4.9	14.2	36.0	327.1
1976	24.4	--	0.1	0.4	2.0	4.3	11.2	35.3	333.2
1977	23.5	--	0.2	0.4	1.1	4.3	10.8	31.7	315.7
DISEASES OF VEINS									
MALE									
1950	2.9	--	0.2	0.6	1.1	3.1	7.3	14.1	25.3
1951	2.5	--	0.0	0.6	0.4	2.7	7.5	12.3	23.2
1952	2.6	--	0.1	0.5	0.9	2.9	8.2	12.2	23.1
1953	3.3	--	0.4	0.4	1.3	3.2	8.8	12.1	33.4
1954	3.1	--	0.0	0.2	1.1	3.3	7.5	16.3	31.1
1955	2.8	--	0.0	0.1	0.9	2.2	8.1	11.5	31.6
1956	3.3	--	0.1	0.4	1.0	2.6	7.3	17.7	37.2
1957	3.8	--	0.1	0.6	2.2	3.1	9.2	18.1	37.5
1958	3.4	--	0.0	0.7	1.1	3.3	9.0	12.7	37.4
1959	3.7	--	0.0	0.6	1.1	4.0	8.0	18.2	42.9
1960	3.4	--	0.2	0.1	1.0	2.0	8.6	16.0	41.5
1961	3.4	--	0.2	0.3	0.8	3.7	8.1	17.1	38.4
1962	4.0	--	0.1	0.3	1.2	3.6	7.6	21.9	49.2
1963	3.8	--	0.1	0.3	0.9	3.3	8.0	14.7	47.7
1964	4.1	--	0.1	0.2	0.7	2.3	9.8	20.2	52.8
1965	3.7	--	0.4	0.3	0.7	2.8	8.7	12.0	48.8
1966	4.1	--	0.1	0.6	1.2	5.1	9.4	18.4	47.2
1967	4.2	--	0.1	0.5	0.9	4.0	11.9	18.1	50.2
1968	4.0	--	0.1	0.2	1.0	2.8	10.1	21.8	49.4
1969	4.6	--	0.1	0.3	1.2	3.1	12.5	27.6	52.3
1970	4.3	--	0.1	0.5	1.1	4.1	10.4	19.0	50.9
1971	4.2	--	0.0	0.2	2.0	2.5	9.7	16.9	53.5
1972	4.2	--	0.2	0.3	1.4	3.7	8.2	18.2	53.8
1973	4.8	--	0.1	0.4	1.1	4.7	10.7	25.8	53.4
1974	5.5	--	0.2	0.5	1.2	5.1	12.2	20.5	67.8
1975	5.4	--	0.3	0.5	1.5	5.3	11.1	28.5	61.2
1976	6.0	--	0.3	0.8	1.6	4.4	13.6	27.5	69.1
1977	6.0	--	0.4	0.7	1.3	5.1	12.5	26.2	69.7
FEMALE									
1950	2.4	--	0.1	0.6	1.2	2.7	6.8	9.2	20.4
1951	2.1	--	0.3	0.3	0.9	2.5	5.2	10.2	20.3
1952	2.5	--	0.3	0.4	1.7	2.1	6.4	17.6	19.0
1953	2.6	--	0.2	0.5	1.4	3.5	5.9	12.2	22.7
1954	2.6	--	0.3	0.3	1.4	1.9	5.4	12.9	27.3
1955	2.2	--	0.1	0.3	1.0	3.2	4.3	11.2	21.7
1956	2.8	--	0.2	0.7	0.8	3.0	8.1	13.2	25.3
1957	3.0	--	0.3	0.3	1.6	2.5	7.9	14.8	27.4
1958	2.6	--	0.1	0.5	0.8	1.7	5.4	11.6	29.3
1959	2.9	--	0.3	0.6	0.9	2.6	6.3	13.1	30.9
1960	2.7	--	0.0	0.2	1.3	1.5	4.3	11.2	34.0
1961	2.8	--	0.1	0.2	0.8	1.0	5.7	11.3	34.1
1962	3.0	--	0.1	0.4	1.1	2.0	4.6	12.3	36.8
1963	3.5	--	0.2	0.5	1.1	2.5	7.3	16.7	38.5
1964	3.6	--	0.1	1.0	1.6	2.7	6.8	12.9	39.5
1965	3.4	--	0.1	0.2	1.7	3.0	6.9	10.0	38.4
1966	4.0	--	0.2	0.6	1.8	3.7	6.0	17.3	42.3
1967	3.7	--	0.0	1.1	1.6	3.1	6.0	15.2	39.1
1968	3.6	--	0.3	0.2	1.7	2.8	6.6	14.0	37.4
1969	4.3	--	0.1	0.9	1.7	3.0	7.2	15.9	45.5
1970	4.3	--	0.1	0.7	1.8	3.3	8.7	15.0	41.2
1971	4.0	--	0.3	0.8	1.5	2.5	6.4	17.9	40.1
1972	4.4	--	0.2	0.9	1.6	2.6	7.6	13.4	45.7
1973	4.7	--	0.2	0.9	1.7	2.6	7.5	14.8	48.2
1974	5.4	--	0.3	0.7	1.7	3.6	7.4	17.7	55.8
1975	5.2	--	0.1	0.5	1.9	3.2	7.9	18.3	52.1
1976	5.7	--	0.3	0.6	1.2	3.8	10.1	15.7	55.9
1977	5.7	--	0.4	0.8	1.1	3.8	8.2	18.1	55.9

CANADIAN MORTALITY RATES, AND PSYCHIATRIC FIRST ADMISSION RATES, 1950-1977 - CONTINUED

OTHER CAUSES

	TOTAL	0-14	15-24	25-34	35-44	45-54	55-64	65-69	70 +
	PER 100,000 POPULATION								
MALE									
1950	307.0	394.9	42.9	50.6	81.7	164.9	392.1	746.0	2023.7
1951	292.4	353.1	41.9	55.5	79.2	155.4	381.3	714.2	1977.4
1952	287.2	361.8	36.5	45.8	69.0	151.7	364.4	706.9	1901.5
1953	278.9	332.5	36.6	41.3	66.0	141.3	350.5	697.6	1968.8
1954	260.6	295.4	28.0	33.1	56.0	133.2	356.1	699.7	1896.2
1955	256.8	281.5	24.2	32.4	54.7	127.5	323.6	716.5	1965.0
1956	253.0	276.2	25.0	31.0	52.3	124.1	317.6	696.1	1938.9
1957	251.4	267.8	20.8	31.6	52.0	127.4	328.2	677.4	1979.5
1958	239.8	248.4	19.0	26.9	48.7	116.5	321.6	708.1	1922.2
1959	238.2	238.8	23.5	26.8	46.9	118.5	312.7	670.5	1961.0
1960	224.3	220.4	20.7	22.5	50.0	106.5	292.7	626.9	1884.0
1961	219.4	214.7	18.3	24.2	40.8	106.8	289.9	615.4	1839.8
1962	214.8	208.6	17.6	21.6	41.5	101.3	290.1	590.8	1823.0
1963	213.1	198.2	17.3	20.5	41.3	109.8	285.3	586.6	1866.2
1964	201.8	179.0	17.6	24.3	43.6	104.8	280.2	568.3	1792.1
1965	193.1	154.9	16.2	21.7	39.7	99.3	270.9	588.8	1837.1
1966	186.1	144.2	13.8	20.8	40.6	95.4	266.3	563.8	1826.9
1967	174.4	130.6	13.4	18.7	38.6	90.1	256.9	581.9	1722.1
1968	172.2	122.3	13.0	18.5	37.6	93.1	241.0	564.4	1789.7
1969	165.0	120.2	13.1	20.0	38.6	92.0	236.2	517.6	1683.6
1970	165.4	119.0	15.4	21.4	41.5	88.5	229.6	519.3	1706.8
1971	164.3	110.1	16.1	20.5	39.3	93.3	234.0	510.6	1737.0
1972	162.0	103.0	16.1	19.6	43.3	90.3	234.7	520.5	1719.8
1973	156.1	93.9	16.9	18.3	40.3	87.7	233.8	501.8	1671.0
1974	154.5	94.3	14.1	19.7	43.0	94.3	231.8	489.4	1629.3
1975	157.1	96.1	17.9	22.5	44.7	95.5	236.0	460.2	1638.4
1976	149.9	91.0	16.9	22.0	38.6	89.3	222.6	439.3	1567.0
1977	146.9	86.6	19.1	24.1	45.8	92.4	212.9	455.3	1483.8
FEMALE									
1950	291.1	310.9	51.4	67.3	93.9	149.4	361.9	745.7	2197.7
1951	278.6	278.8	54.6	71.5	85.8	147.1	339.2	694.4	2158.8
1952	270.0	280.7	41.1	62.8	82.0	149.0	319.0	652.8	2070.0
1953	259.6	254.5	31.2	52.7	71.6	137.1	315.9	653.1	2105.5
1954	244.6	228.7	27.9	47.0	65.8	120.6	300.6	620.4	2048.6
1955	238.1	216.6	24.4	43.5	55.1	112.4	291.9	583.9	2071.8
1956	239.6	223.3	22.9	36.4	57.2	117.4	292.0	587.6	2042.5
1957	232.8	211.7	21.1	34.7	49.5	108.7	281.0	614.6	2023.4
1958	223.0	197.7	19.1	32.2	51.6	94.0	265.2	584.7	1976.6
1959	222.4	186.9	18.8	33.4	47.0	102.0	262.9	571.7	2002.0
1960	209.9	170.1	17.5	26.5	46.8	86.9	240.7	541.1	1947.7
1961	207.7	166.9	16.8	30.2	43.7	87.9	239.4	536.8	1898.0
1962	204.2	167.9	16.5	25.5	41.3	86.2	229.2	524.2	1849.7
1963	198.8	152.8	15.7	23.4	40.8	88.0	231.1	489.7	1845.5
1964	187.1	138.2	13.6	23.0	37.6	87.0	220.8	474.8	1742.3
1965	184.7	125.2	11.9	22.5	38.1	83.5	216.3	464.7	1786.1
1966	177.4	114.3	11.9	22.2	36.6	76.9	212.5	467.1	1719.7
1967	168.0	105.9	10.4	19.4	33.8	73.6	188.4	421.9	1658.7
1968	166.9	99.8	10.8	18.9	35.2	74.8	188.7	421.3	1646.5
1969	163.6	97.4	10.1	18.4	38.3	75.2	177.5	388.7	1604.0
1970	161.8	92.9	11.9	18.7	37.3	70.4	175.0	408.1	1572.5
1971	160.8	84.7	11.8	18.6	39.1	72.4	172.3	357.8	1593.2
1972	161.7	83.9	10.6	17.0	40.1	68.6	168.0	381.2	1596.3
1973	157.6	76.8	9.7	15.8	33.4	74.4	170.9	350.9	1557.4
1974	156.8	76.0	11.0	17.0	31.9	69.9	156.3	352.3	1550.9
1975	158.6	74.8	12.6	17.8	34.6	73.2	161.5	346.8	1538.8
1976	150.4	73.9	10.7	15.2	30.1	66.8	144.7	314.2	1452.5
1977	147.1	72.5	10.5	15.6	28.1	67.6	138.6	311.1	1393.5
ALL CAUSES									
MALE									
1950	1015.5	546.8	152.8	174.0	322.6	813.2	1988.2	3615.6	8649.7
1951	1014.1	500.8	159.7	191.6	316.3	814.0	1996.2	3484.9	8781.9
1952	1000.6	505.3	164.5	192.8	322.1	822.9	1995.4	3534.1	8388.6
1953	989.3	473.0	166.8	180.5	318.7	811.7	1962.5	3524.2	8504.0
1954	940.3	425.7	148.2	173.9	293.6	776.6	1940.1	3524.8	8280.1
1955	947.6	405.2	151.5	173.5	284.5	764.8	1927.7	3612.9	8599.4
1956	946.5	396.8	151.4	178.2	285.8	761.6	1954.6	3596.0	8601.5
1957	956.9	389.4	154.5	181.2	303.0	788.2	2035.9	3734.7	8693.4
1958	919.7	362.0	135.3	166.1	295.2	774.2	1977.8	3640.6	8524.3
1959	925.8	342.6	149.2	167.4	284.6	757.3	1955.0	3629.5	8816.8
1960	907.6	321.4	144.1	156.3	282.1	758.0	1946.7	3528.6	8734.1
1961	900.6	308.8	139.3	156.3	282.7	761.7	1925.0	3587.0	8643.2
1962	897.9	300.4	140.6	160.4	286.5	745.8	1931.7	3526.8	8685.3
1963	905.1	288.7	143.3	161.1	282.9	754.3	1946.8	3564.5	8904.0
1964	887.5	261.6	146.9	161.5	293.0	758.9	1962.8	3548.5	8700.9
1965	887.4	234.2	146.0	162.9	290.3	764.3	1935.8	3591.2	8955.6
1966	879.7	219.4	155.7	165.7	285.9	771.7	1937.9	3638.7	8873.9
1967	868.0	204.3	159.3	156.3	293.0	768.3	1934.3	3633.8	8775.1
1968	867.1	190.0	152.1	158.7	288.7	744.4	1898.4	3713.3	8971.7
1969	864.3	189.2	158.9	161.8	287.8	751.2	1873.3	3684.3	8886.6
1970	863.5	186.6	157.1	159.7	289.8	741.4	1898.2	3673.2	8830.4
1971	860.5	175.0	162.3	160.3	296.0	748.3	1852.2	3514.0	8852.8
1972	872.6	168.2	186.7	162.4	294.9	739.0	1858.9	3613.9	8903.6
1973	873.0	153.3	190.7	158.3	300.2	747.3	1883.4	3508.9	8846.6
1974	872.2	151.1	189.3	158.9	294.3	752.3	1857.6	3532.3	8826.5
1975	865.3	146.2	181.5	159.5	287.3	734.8	1833.3	3456.2	8656.7
1976	855.8	141.4	163.8	154.1	264.9	731.8	1816.8	3366.3	8605.0
1977	840.8	131.4	168.9	154.2	272.8	721.0	1777.2	3317.7	8285.0
FEMALE									
1950	794.4	421.7	88.3	124.1	259.3	553.5	1279.3	2631.2	7711.2
1951	787.2	389.9	92.5	128.6	246.9	540.0	1285.1	2475.9	7779.0
1952	749.7	389.7	77.3	120.9	233.1	534.6	1223.7	2363.4	7247.3
1953	744.6	356.1	68.7	110.0	226.5	520.3	1223.0	2421.0	7367.4
1954	701.2	319.9	63.8	104.3	217.8	492.8	1150.6	2314.8	7037.8
1955	695.1	308.7	59.6	98.5	193.2	458.7	1146.5	2269.6	7137.6
1956	702.3	314.1	56.9	90.9	193.7	466.5	1161.7	2232.7	7220.2
1957	696.0	300.1	62.2	96.6	186.2	462.3	1169.0	2337.0	7111.1
1958	668.0	275.7	52.9	87.7	187.4	433.2	1093.5	2218.6	6967.2
1959	681.3	262.0	54.9	89.9	177.2	443.6	1091.8	2212.1	7195.9
1960	656.3	240.5	54.1	78.5	175.3	432.7	1059.4	2138.0	6945.8
1961	647.4	231.5	51.2	80.8	165.2	421.3	1025.5	2145.1	6819.7
1962	652.5	232.3	54.7	81.4	173.9	418.4	1033.7	2076.9	6834.8
1963	656.6	214.4	59.0	78.8	168.5	420.8	1034.3	2071.7	6959.5
1964	629.2	195.2	54.0	77.5	164.5	411.7	1009.7	2009.9	6604.5
1965	634.4	180.3	53.2	77.0	168.6	424.0	985.7	1954.7	6742.0
1966	624.1	166.4	53.6	77.9	169.2	412.4	981.5	1961.0	6563.5
1967	613.3	157.2	53.4	76.8	169.7	405.6	972.8	1901.3	6364.1
1968	619.7	146.4	54.5	75.7	168.1	404.5	951.8	1879.5	6465.3
1969	617.2	141.1	53.7	74.5	172.5	413.1	943.4	1851.8	6326.1
1970	615.3	138.1	56.2	79.0	172.5	401.5	926.9	1847.2	6211.4
1971	612.8	129.5	58.9	74.8	172.3	382.7	900.6	1750.8	6195.1
1972	626.2	123.8	59.1	76.0	172.3	394.4	922.7	1759.7	6265.4
1973	625.7	114.9	61.6	73.6	164.2	395.9	924.4	1696.9	6195.0
1974	629.6	114.0	60.6	71.8	156.2	394.2	907.9	1735.5	6196.3
1975	623.0	111.2	57.6	70.0	159.3	386.1	888.4	1724.1	5979.3
1976	617.3	105.3	53.3	65.2	147.1	371.4	860.2	1669.9	5935.4
1977	606.2	102.9	52.6	63.6	147.4	375.7	841.6	1622.7	5689.1

CANADIAN MORTALITY RATES, AND PSYCHIATRIC FIRST ADMISSION RATES, 1950-1977 - CONCLUDED
PSYCHIATRIC FIRST ADMISSION RATES

	MALE				FEMALE			
	PSYCHOSES	NEUROSES	ALCOHOLISM	TOTAL	PSYCHOSES	NEUROSES	ALCOHOLISM	TOTAL
	PER 100,000 POPULATION							
1950	52.9	4.4	3.4	78.4	47.6	7.0	0.5	67.5
1951	54.9	5.6	4.8	83.4	49.6	8.9	0.7	72.0
1952	55.4	5.6	5.4	85.4	52.3	8.6	0.8	76.3
1953	56.0	7.1	9.5	92.7	52.7	11.5	1.5	79.3
1954	60.1	12.9	12.1	111.5	57.8	17.2	1.9	94.8
1955	66.2	18.5	14.3	126.3	70.6	28.1	2.4	119.1
1956	68.0	17.5	15.2	127.0	68.0	29.7	3.0	119.2
1957	67.9	18.2	15.0	126.8	68.6	31.5	2.6	122.3
1958	68.7	20.3	14.2	132.4	69.6	36.1	2.8	130.9
1959	68.3	24.8	16.9	143.0	71.9	41.7	3.2	139.4
1960	70.1	24.4	15.7	145.6	73.5	38.7	3.3	140.2
1961	72.7	25.8	19.6	155.1	74.5	43.7	3.3	149.9
1962	74.3	28.9	20.5	164.1	76.5	49.1	4.0	157.7
1963	68.8	31.0	24.4	161.6	71.2	55.0	4.7	157.9
1964	71.1	39.3	56.7	207.0	75.3	67.5	8.2	180.7
1965	69.2	41.1	61.8	213.9	73.1	72.5	7.5	182.1
1966	69.2	38.0	55.5	204.4	74.7	70.2	7.7	184.0
1967	68.4	40.6	57.2	213.5	72.3	71.5	7.8	186.5
1968	70.1	44.7	54.7	222.6	77.9	76.4	6.5	198.5
1969	67.9	45.9	58.3	231.1	74.5	84.7	8.2	210.8
1970	72.1	51.4	60.5	252.2	75.8	92.9	10.6	231.7
1971	73.4	51.2	75.0	275.4	80.2	94.3	12.3	248.0
1972	70.6	47.4	66.7	260.0	76.2	88.3	11.4	234.7
1973	70.3	47.8	72.3	268.1	72.3	87.6	12.8	229.5
1974	76.6	52.2	70.8	280.9	79.8	103.3	13.0	256.9
1975	75.7	51.8	79.3	286.7	83.7	101.6	16.6	265.2
1976	78.0	52.3	70.9	270.4	84.4	95.7	14.9	252.1
1977	78.9	57.9	67.5	269.9	82.9	101.7	16.5	253.4

APPENDIX D

COMPONENTS OF THE UNITED STATES UNEMPLOYMENT RATE: TIME SERIES ANALYSIS 1950-1975

Notes and Assumptions

United States data were employed for this analysis because of the longer data series available for the separation rate. Additionally, the United States data separate the total separation rate into its quit and layoff components. It is assumed that the manufacturing sector is representative of the economy, and it seems unlikely that employment variables measured for other sectors would behave in a counter-cyclical manner with regard to these variables. The proportion of the labour force aged 16-24 was used as a proxy for new entrants to the labour force, which would likely cause upward pressure on the unemployment rate.

Variables

URATE - Average annual unemployment rate, all civilian workers, 16 years of age and over.(1)

AVDUR - Average annual duration of unemployment (weeks).(2)

PYOUNG - Proportion of the total civilian labour force aged 16-24.(3)

QUIT - Quit rate per 100 employees on manufacturing payrolls.(4)

LAYOFF - Layoff rate per 100 employees on manufacturing payrolls.(4)

Zero-order Correlations

The inter-correlation matrix of the time-series for the above-mentioned variables appears below. YEAR was included to investigate the degree of secular trend.

Correlation Matrix: Unemployment Variables 1950-1975

	YEAR	URATE	AVDUR	PYOUNG	QUIT	LAYOFF
URATE	.3536	-				
AVDUR	- .0745	.7641	-			
PYOUNG	.9048	.3301	- .1449			
QUIT	.0124	- .7539	- .8420	.2109	-	
LAYOFF	- .2668	.5622	.5891	- .4459	- .8402	-

(1) **Source:** Table 56. Major Unemployment Indicators 1948-77 in Bureau of Labor Statistics, **Handbook of Labor Statistics 1978** (U.S. Department of Labor: 1979, 175).

(2) **Source:** Series 91 Average (Mean) Duration of Unemployment (weeks) in **Handbook of Cyclical Indicators** (U.S. Department of Commerce: 1977, 101).

(3) **Source:** Calculated from Table 3. Civilian Labor Force by Sex, Race and Age, 1947-77 in Bureau of Labor Statistics **Handbook of Labor Statistics 1978,** (U.S. Department of Labor: 1979, 28).

(4) **Source:** Table 54. Labor Turnover, Rates of Employees on Manufacturing Payrolls 1930-77 in Bureau of Labor Statistics **Handbook of Labor Statistics 1978,** (U.S. Department of Labor, 1979, 164).

From this matrix it is evident that average duration is the most important zero-order correlate of the unemployment rate. Two of the hypothesized incidence components, PYOUNG and LAYOFF are positively correlated with URATE as well, and the inverse relationship between URATE and QUIT suggests that the latter is counter-cyclic. People are less likely to quit their jobs in periods of higher unemployment.

The three positive correlates of URATE were entered into a multiple regression equation, after subtracting the linear trend from URATE, and PYOUNG.

The results appear below.

Regression Results: Predicting United States Unemployment Rate 1950–1975

Variable	Beta	F	Equation
AVDUR	.60019	47.812	R^2 .89396
LAYOFF	.53680	30.434	F 61.82458
PYOUNG	.39242	24.084	dw 1.10355

In this equation, AVDUR remains as the most important predictor of the unemployment rate during this period. LAYOFF, appears as the second strongest, although since PYOUNG was approaching collinearity with the time trend there was less variation left after the trend was subtracted. A more detailed analysis would require a more explicit measure of the number of new entrants to the labour force.

APPENDIX E

CORRELATIONS BETWEEN ANNUAL FIRST DIFFERENCES IN INCOME OF IDENTICAL INDIVIDUALS AND THE UNEMPLOYMENT RATE 1966-1967 TO 1976-1977: CANADIAN MALES BY AGE GROUP

Age group	R
Less than 25 years	- .63(1)
25-29 years	- .42
30-34 "	- .42
35-39 "	- .44
40-44 "	- .45
45-49 "	- .42
50-54 "	- .42
55-59 "	- .43
60-64 "	- .43
65-69 "	- .39
70 years and over	- .41
Total	- .43

(1) Denotes that $p < .05$ where $n = 11$.

Source: Income Data: Historical Tables of Individual Statistics, Table 3, Income Change of Identical Individuals. Annual issues of Taxation Statistics, 1969-1979, published by Revenue Canada.

APPENDIX F

CORRELATIONS BETWEEN UNEMPLOYMENT RATE, GINI COEFFICIENT AND SELECTED CAUSES OF MORTALITY, UNITED STATES 1947-1972

Data Sources

GINI - Lorenz Gini, computed from family income as in Paglin (1975) (detrended).

U - Average Annual Unemployment Rate. Table 4/1, Unemployment Rates: 1947-1972, **Social Indicators 1973** (U.S. Department of Commerce: 1973, 136).

CIR - Age standardized cirrhosis of the liver death rate (detrended).

HOM - Age standardized homicide rate (detrended).

SUI - Age standardized suicide rate (detrended).

Table 5/7, Death Rates for Selected Causes 1940-1974, **Social Indicators 1976** (U.S. Department of Commerce: 1977b, 194).

Correlations: Mortality Rates and Synchronous and Lagged Values of Gini and U Length

	Length of lag period (years)					
	(0)	(1)	(2)	(3)	(4)	(5)
Cause of death - U:						
CIR	- .49(1)	- .50(1)	- .39(1)	- .25	- .23	- .04
HOM	- .23	- .36	- .46(1)	- .45(1)	- .31	- .15
SUI	.37(1)	.35	.18	- .01	.32	.28
Cause of death - Gini:						
CIR	- .18	- .21	- .21	- .12	- .14	.16
HOM	.11	- .12	- .19	- .29	- .20	.01
SUI	.37(1)	.21	.04	- .06	.03	- .15

(1) Denotes $p < .05$ $N = 21$.

APPENDIX G

CORRELATIONS BETWEEN TOTAL CIVILIAN UNEMPLOYMENT RATE AND UNEMPLOYMENT RATE BY AGE GROUPS: UNITED STATES MALES, 1950-1975

Age group	R
16 and 17 years	.74
18 and 19 "	.94
20-24 years	.97
25-34 "	.99
35-44 "	.94
45-54 "	.88
55-64 "	.79
65 years and over	.87

Note: $p < .05$ in all cases, $N = 26$.
Source: Table 58. Unemployed Persons and Unemployment rates, by Sex and Age, 1948-1977, in U.S. Department of Labor, Bureau of Labor Statistics, **Handbook of Labor Statistics 1978** (U.S. Department of Commerce: 1979, pp.178-179).

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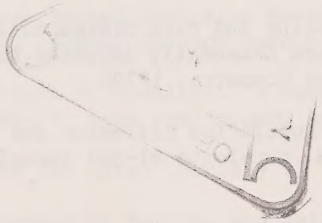

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